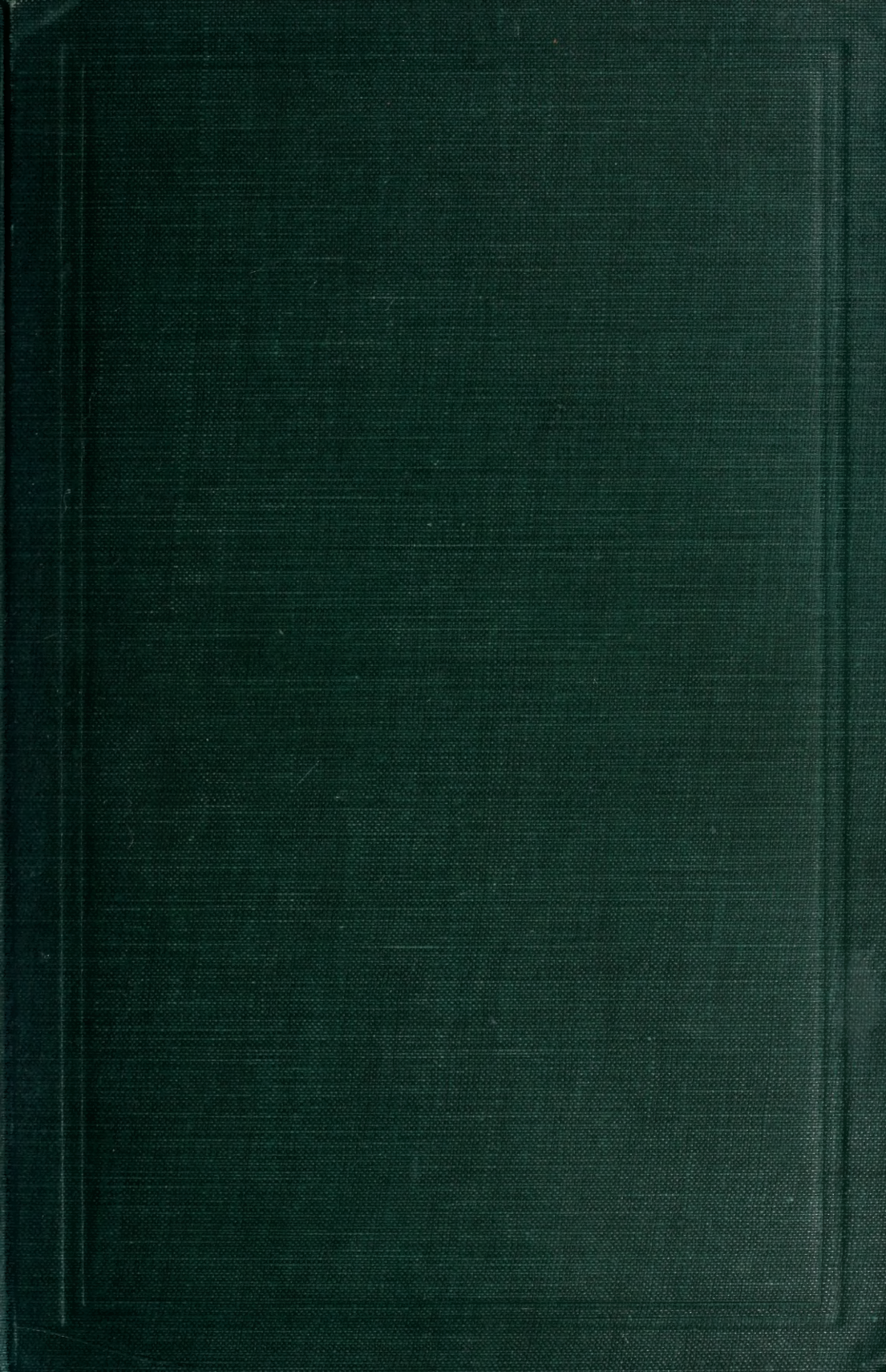
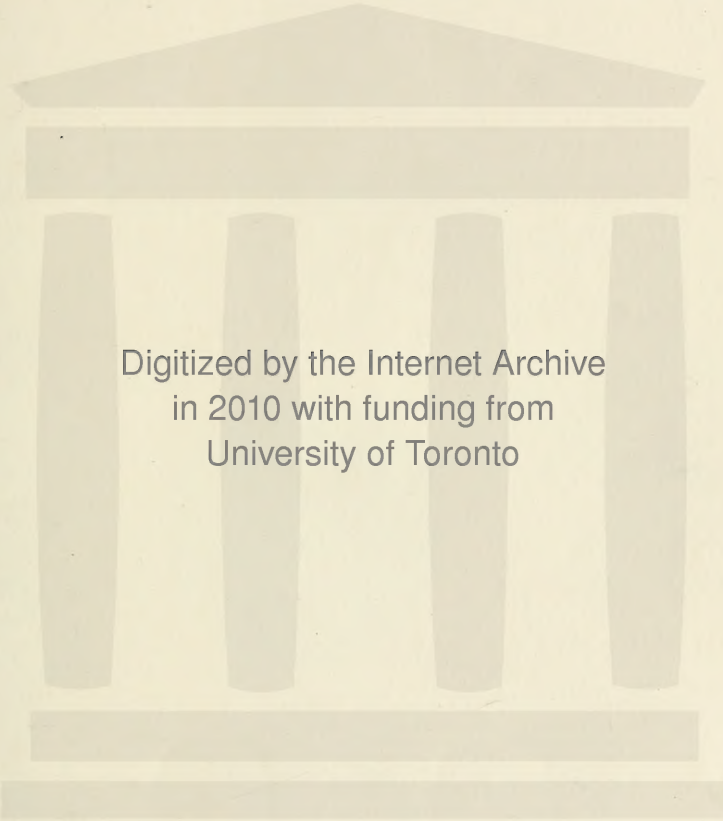






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THE OFFICIAL
GOOD ROADS YEAR BOOK
OF THE
UNITED STATES



1912
COLORADO BUILDING
WASHINGTON, D. C.



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AMERICAN ASSOCIATION FOR HIGHWAY IMPROVEMENT

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TABLE OF CONTENTS

	Page
Advertising Section.....	407
American Association for Highway Improvement.....	8
Analysis of State Aid Bill.....	181
Ancient Road Builders.....	1
Appropriations.....	221
Asphalt Blocks on Roads.....	205
Alabama.....	27, 221, 267, 282, 325, 344, 372
Arizona.....	33, 221, 267, 345, 372
Arkansas.....	25, 222, 267, 345
Alaska.....	222, 267
Associations.....	337
Benefits of Good Roads.....	185
Bituminous Macadam Roads.....	196
Brick Roads.....	199
Bond Issues.....	221
Books.....	314
Bridges.....	215
Bulletins and Circulars.....	320
By-laws.....	11
California.....	37, 222, 268, 283, 325, 345, 372
Colorado.....	29, 223, 268, 283, 326, 345, 372
Concrete Roads.....	201
Connecticut.....	43, 223, 268, 326, 346, 373
Contractors.....	372
Constitution.....	10
Convict Labor.....	282
Culverts.....	215
Delaware.....	46, 244, 268, 326, 375
District of Columbia.....	269, 326
Dust preventives.....	212
Earth Roads.....	187
Florida.....	50, 225, 269, 326, 346, 376
French as Road Builders.....	2
Georgia.....	52, 228, 270, 286, 326, 346, 376
Gravel Roads.....	192
Highway Engineering in Colleges.....	262
Highway Officials.....	267
History of Road Building.....	1
Idaho.....	55, 228, 270, 326, 348
Illinois.....	56, 228, 270, 327, 348, 377
Indiana.....	58, 229, 270, 327, 348, 379
Inventions.....	6
Iowa.....	62, 230, 271, 327, 349, 384
Kansas.....	63, 230, 271, 327, 349, 384
Kentucky.....	67, 231, 271, 327, 349, 385
Legislation.....	26
Louisiana.....	69, 231, 271, 328, 350, 385
MacAdam.....	5

	Page
Macadam Roads.....	194
Maine.....	71, 232, 272, 328, 350, 387
Maintenance and Repair.....	208
Manufacturers.....	361
Maryland.....	75, 232, 272, 328, 350, 388
Massachusetts.....	79, 233, 272, 329, 350
Members.....	16
Mileage.....	221
Michigan.....	84, 235, 272, 288, 330, 350, 389
Minnesota.....	88, 235, 273, 290, 330, 350, 389
Mississippi.....	91, 236, 293, 330, 350, 390
Missouri.....	93, 236, 273, 291, 330, 350
Montana.....	97, 237, 273, 331, 351, 390
Nebraska.....	100, 238, 274, 331, 351, 390
Nevada.....	105, 238, 274, 331, 390
New Hampshire.....	108, 238, 274, 331, 390
New Jersey.....	112, 239, 274, 331, 352, 391
New Mexico.....	115, 241, 275, 293, 332, 352, 393
New York.....	116, 241, 275, 332, 352, 393
North Carolina.....	122, 241, 275, 292, 333, 352, 396
North Dakota.....	123, 243, 276, 333, 354, 396
Office of Public Roads.....	260
Ohio.....	125, 244, 276, 333, 355, 396
Oklahoma.....	132, 276, 334, 356
Oregon.....	137, 276, 293, 334, 356
Patents.....	300
Patented Methods of Road Construction.....	206
Pennsylvania.....	139, 277, 334, 356, 400
Periodicals.....	319
Rhode Island.....	144, 277, 334, 357, 401
Romans as Road Builders.....	1
Sand Clay Roads.....	190
South Carolina.....	146, 277, 334, 357, 401
South Dakota.....	149
State Aid Bill (suggested).....	173
State Geologists.....	280
Telford.....	5
Tennessee.....	150, 278, 335, 358, 401
Texas.....	152, 294, 335, 358, 402
Toll roads.....	2
Tresaguet.....	4
Trade Names.....	311
Types of road.....	187
Utah.....	155, 278, 297, 335
Vermont.....	157, 279, 335, 402
Virginia.....	160, 279, 335, 359, 402
Washington.....	164, 279, 297, 335, 360, 403
West Virginia.....	168, 280, 336, 360, 404
Wisconsin.....	169, 280, 336, 360, 404
Wyoming.....	170, 280, 298, 336, 360, 404

ALPHABETICAL LIST OF ADVERTISERS

	Page
Acme Road Machinery Company.....	408
Adams & Company, J. D.....	413
American Asphaltum & Rubber Company.....	410
Amies Road Company.....	409
Association of American Portland Cement Manufacturers.....	412
Atlas Portland Cement Company.....	411
Austin-Western Company.....	414
 Baker Manufacturing Company.....	 415
Barber Asphalt Paving Company.....	416
Barrett Manufacturing Company.....	418
Better Roads Publishing Company.....	421
Bingham, Clarence A.....	407
Birdsboro Stone Company.....	420
Blanchard, Arthur H.....	407
Buffalo Steam Roller Company.....	417
 Case Threshing Machine Company, J. I.....	 419
Cast Iron Pipe.....	442
 Deckman-Duty Brick Company.....	 421
 Engineering Publishing Company.....	 435
Engineering Record.....	413
 Farquhar Company, A. B.....	 421
Frick Company.....	425
 Glide Road Machine Company.....	 430
Good Roads Machinery Company.....	422
Griffiths Iron Works Company.....	421
 Hailes, Theodore C., Jr.....	 421
Hartranft Cement Company, Wm. G.....	424
Hastings Pavement Company.....	423
Headley Good Roads Company.....	415
Howard, J. W.....	407
Huber Manufacturing Company.....	415
 Institute of Industrial Research.....	 407
International Harvest Company of America.....	426
Iroquois Iron Works.....	425
 List of Manufacturers of Cement, Concrete Stone and Crushed Stone	 428
 Meehan & Sons, Thomas.....	 407
Memphis Stone and Gravel Company.....	407
Metropolitan Paving Brick Company.....	407

	Page
National Highways Association.....	427
National Paving Brick Manufacturers Association.....	429
Portage Silica Company.....	407
Port Huron Engine & Thresher Company.....	430
Potts Powder Company.....	430
Robeson Process Company.....	431
Roemac, Limited, Inc.....	436
Solvay Process Company.....	432
Standard Asphalt & Rubber Company.....	434
Standard Oil Company of New York.....	433
Sun Company.....	436
Texas Company, The.....	437
Thornton Fire Brick Company.....	436
Timmons, R. L.....	407
Universal Portland Cement Company.....	438
Universal Road Machinery Company.....	439
Vulcanite Portland Cement Company.....	440
Wadsworth Stone & Paving Company.....	443
Warren Brothers Company.....	441
Wassell Brick Company.....	421

American Association for Highway Improvement.....	445
American Tar Company.....	445
Chicago Portland Cement Company.....	444
Girard Engineering Company.....	445
Tarrant Manufacturing Company.....	445
Traylor Engineering and Manufacturing Company.....	444

HISTORY OF ROAD BUILDING

Ancient Road Builders

When or where the first road was built we do not know. Herodotus speaks of a great Egyptian road on which King Cheops employed 100,000 men for a period of ten years. According to the historian, this road was built of massive stone blocks 10 feet deep, and lined on both sides with temples, mausoleums, porticoes and statues. The streets of Babylon are said to have been paved as early as 2000 B.C., and several well surfaced roads radiated to neighboring cities. Carthage, before its fall, was the center of a highly developed road system. The ancient Peruvians had a wonderful system of national roads connecting all the principal parts of their empire.

Bridges were also built by the ancients at a very early date. The Euphrates, at Babylon, was crossed by a stone bridge prior to 2000 B.C., and it is known that the Chinese built bridges as public works as early as 2900 B.C.

The Romans as Road Builders

The first definite and fully authentic information concerning the systematic construction and maintenance of permanent roads comes to us from the Romans. It is generally understood that the Romans learned the art of road building from the Carthaginians. However, the construction of their first great road was as perfect as that of any of their later ones.

The first of the great Roman roads was from Rome to Capua, a distance of 142 Italian miles, and was begun by Appius Claudius, about 312 B.C. It was known as the Appian Way or "Queen of Roads." This road was later extended to Brundisium, a total of 360 miles, and was probably completed by Julius Cæsar. About 220 B.C. the Flaminian Way was built. It crossed the river Nar on a stone bridge which had a central span of 150 feet with a rise of 100 feet. When Rome reached the height of her glory, under the reign of Augustus, no less than 29 great military roads radiated from the city. These roads extended to every part of the vast empire and are estimated to have had a total length of 50,000 miles.

The Roman construction was in general extremely massive. The Appian Way is said to have been in good repair 800 years after

it was built. On a carefully prepared earth subgrade was placed four successive courses or layers; the statumen or foundation course, the rudus or second course, the nucleus or third course, and the pavimentum or wearing surface. The top and bottom courses consisted in general of large flat stones, while the two intervening courses were built of smaller stone or other suitable material laid in lime mortar.

With the fall of the Roman Empire the roads were neglected and gradually fell into decay, so that today but little more than a trace remains of these splendid achievements.

The French as Road Builders

The Romans built and improved many roads throughout what is now France, but later these fell into decay. It was not until the beginning of the seventeenth century that interest in road building revived to any considerable extent. In 1661 Colbert was appointed comptroller of finance, and during his ministry 15,000 miles of hard road were built by means of enforced peasant labor under the old feudal institution of the corvee. The corvee prevailed with the utmost rigor until 1774, when Turgot abolished some of its most objectionable features. It was finally abolished in 1787.

The present road system of France was really founded by Napoleon. He adopted very largely the innovations instituted by Tresaguet, and perfected a splendid administrative system.

The most striking feature of the French road system is the skilled supervision provided in every grade of road work and in every unit of the administrative organization. The basis of the French system is the School of Roads and Bridges, one of the finest technical schools in the world, and maintained entirely at the expense of the National government. From the graduates of this school are chosen the highway engineers who are entrusted with the construction and maintenance of the roads of France.

The total mileage of all roads in France is about 355,000 miles. Of these 23,820 miles are classed as national roads and are, therefore, the property of the State. The remaining roads are divided into departmental and vincinal routes, for which the state only makes occasional appropriations for construction and which are invariably maintained by the local governments.

Toll Roads

The earliest mention we have of the exaction of tolls is probably that given by Strabo, on the roads leading from Babylon to Syria. It is not until 1346 that we find the toll system definitely adopted

as a means of raising revenue for road maintenance and repair. In that year Edward III of England granted a commission to the Master of the Hospital of St. Giles and John Holborn to collect tolls on vehicles passing on the road leading from the Hospital of St. Giles to the Old Temple, London, and also on an adjoining road called the Portal. But it was not until the latter half of the eighteenth century and first part of the nineteenth century that this method of raising road revenues reached its greatest popularity. This took the form of a regular flood of turnpike acts passed by Parliament. It is estimated that in 1838 no less than 1100 turnpike trusts were in existence throughout the kingdom. The cost of collecting the tolls, however, often nearly equaled the income, leaving little or nothing for maintenance. In 1871 the census showed that 5000 persons in England and Scotland were engaged in merely collecting tolls. In 1857 Ireland freed herself from toll gates, and in 1878 Parliament passed an act abolishing tolls in England.

Tolls on vehicles were never popular in France and while introduced somewhat at different periods, never became general.

In the United States the first toll road was the Lancaster Pike, between Philadelphia and Lancaster, Pennsylvania, a distance of $62\frac{1}{2}$ miles, the construction of which was authorized in 1792. Bridges were also constructed by private capital and tolls charged for crossing. The turnpike improvements continued to expand rapidly until in 1828 the length of chartered turnpikes in Pennsylvania amounted to 3110 miles, of which 2380 miles were completed at a cost of \$8,431,059.50. It is stated that none of these roads had, up to that time, yielded sufficient dividends to remunerate their proprietors. By 1811 over 317 turnpikes had been chartered in New York and the New England States, having a combined length of 4500 miles and a capital of over \$7,500,000. With the introduction of the railroad, interest in turnpike building practically ceased, and today there remain in the United States very few roads on which toll is collected on passing traffic.

The Cumberland Road.—Popular tradition generally attributes the conception of the National Road to Henry Clay. However, Albert Gallatin seems to have made the first definite suggestion of this road, while Henry Clay soon became its ablest champion.

By an act of Congress approved by President Jefferson on March 29, 1806, \$30,000 was appropriated toward the survey and construction of a road leading from a point on the Potomac at or near Cumberland, Maryland, to the Ohio River at or near a point opposite the town of Steubenville. This act provided that the road be cleared to a width of four rods, and that no grade exceed five degrees. An act of Congress, May 15, 1820, provided \$10,000 for laying out a road from Wheeling, Virginia, to the Mississippi

River near St. Louis. This was really to be a continuation of the Cumberland or National Road. The road was to be laid out 80 feet wide.

In 1835 arrangements were completed whereby the portion of the National Road between Cumberland and Wheeling was taken over by the respective States and operated as a toll road. Appropriations, however, were continued on the portion west of the Ohio River until May 25, 1838, when the last direct appropriation for construction was made. The total amount appropriated by Congress was \$6,824,919.33.

The length of the line first opened was 130 miles and the cost of construction \$1,700,000. The first stage coach bearing the United States mail from Cumberland to Wheeling passed over the road on August 1, 1818.

West of the Ohio, the road led through Columbus, Indianapolis and Terre Haute. The road was surfaced to Columbus, but west of that point it was only surfaced in places; and about 1850 most of the road was absorbed by local turnpike companies. Before the road was completed beyond the western boundary of the State of Indiana, the steam railway had become the chief agency of transportation and the National Road came to an end on the prairies of Illinois.

Great Road Builders

Tresaguet.—Pierre-Marie Tresaguet was born at Nevers, in 1716, died in Paris, 1796. While he was a great engineer and made many improvements for river navigation, posterity knows him only as a great road builder. Tresaguet may well be called the father of modern road building. In 1775, when MacAdam was but twenty-one years of age, Tresaguet presented a report to the Assembly of Bridges and Highways which amounted in reality to a treatise on road construction. The real value of Tresaguet's work was; first, in recognizing the need of constant maintenance and devising a means for carrying it out; second, improving the methods of construction and reducing the cost. The prevailing form of stone roads up to this time consisted of a transversely level stone pavement on which was placed broken stone to the depth of 12 inches at the sides and 18 inches at the middle. Tresaguet improved the drainage, gave a crown to the stone pavement or foundation, and reduced the depth of broken stone to a uniform thickness of 10 inches. The roads built by Tresaguet differ but little from those built by Telford in Scotland some thirty years later. While Tresaguet was not fortunate enough to leave his name to the type of road he advocated and built, he laid the foundation upon which it was possible for Napoleon to build the

great system of French highways. Tresaguet laid especial emphasis on organized, continuous maintenance. He first began the organization of cantonniers, which are the very backbone of the present French system of road maintenance.

John Loudon MacAdam.—John Loudon MacAdam was born at Ayr, Scotland, September 21, 1756, and died November 26, 1836.

While MacAdam was not the inventor of the road which now bears his name, he nevertheless deserves great credit for the work he did. The broken stone road as adopted by MacAdam was used in practically the same form in several parts of Europe, though he was no doubt the first to grasp and fully explain the theory of the broken stone road without a paved foundation.

MacAdam demonstrated that stone when broken to the proper size and placed on a properly drained and graded earth foundation would so consolidate under traffic as to be thoroughly waterproof and capable of carrying the heaviest vehicles without injury. He held that the earth, in fact, sustained the load, and all that was necessary was to thoroughly drain the roadbed and protect the surface with an impervious covering.

At the death of his father in 1770, young MacAdam went to live with his uncle, a merchant in New York City. In 1783 he returned to Scotland and was shortly appointed as deputy-lieutenant for the county of Ayreshire. In performing his duties as magistrate and trustee of roads, MacAdam became impressed with the lack of scientific principles in the construction and maintenance of the roads. In 1816, he became inspector for the Bristol "Turnpike Trust" and supervised the reconstruction and repair of 178 miles of roads. In 1817 he built the first macadam roads in London, the approaches to Blackfriars and Westminster bridges. In 1823 MacAdam moved to London, where he was appointed street commissioner in 1817. Slowly the system of construction and maintenance which he advocated spread throughout the entire empire. In 1836 he returned to Scotland where he owned a house in the little town of Moffat: but he was not long permitted to enjoy his leisure, for he died the same year.

His principal writings are: *A Practical Essay on the Scientific Repair and Preservation of Public Roads*, London, 1819, and, *Remarks on Present State of Road Making*, London, 1820.

Thomas Telford.—Thomas Telford was born in Dumfriesshire, Scotland, August 9, 1757, and died September 2, 1834, and was buried in Westminster Abbey.

Thomas Telford was one of the greatest civil engineers of his time. He was one of the founders of the "Institution of Civil Engineers" and was annually elected as its president until his death. His works were recognized both at home and abroad. For the Austrian government, he built the road from Warsaw, to

Brest, while the King of Sweden conferred the order of knighthood of "Gustavus Vasa" in recognition of his services on the Gotha Canal. As some of his most notable achievements may be mentioned the following bridges: Across the Tay at Dunkeld, the Menai Straits, the Conway bridge, the Deanbridge at Edinburgh, and the Broomielaw bridge at Glasgow. Canals: Ellesmere, Caledonian, Gloucester and Berkeley, Grand Trunk, Macclesfield, Birmingham and Liverpool Junction, and the Gotha. Harbors: Pulteneytown, Aberdeen, Dundee, Dover, and the St. Katherine docks at London.

In 1803 he was appointed engineer for the construction of 920 miles of roads in the highlands of Scotland. Later, he perfected the road communication between London and Scotland and the northern towns of England. An undertaking of equal magnitude and importance with that in the highlands of Scotland was a system of roads through the more inaccessible parts of Wales.

The form of construction most generally used by Telford, and which bears his name, is very similar to that employed much earlier by Tresaguet. The foundation course on which is placed the broken stone consists of stones about 10 inches by 6 inches by 4 inches, in dimension, carefully placed by hand and keyed firmly with smaller chips. Care is taken to secure the best possible drainage. At the present time, the Telford system is more commonly employed abroad than in this country. American road builders usually only resort to the Telford system when the natural earth foundation is weak. The chief objection is generally stated as being the high first cost due to the large amount of hand labor required.

Principal Inventions

The Steam Road Roller.—The steam road roller was invented by M. Louis Lemoine, of Bordeaux, France, and a patent was granted to him by the French government in 1859. M. Lemoine's roller was first used on the road in the Bois de Boulogne in 1860. The first English patent was granted to Messrs. Clark and Batho in 1863. About 1864 a roller built under this patent was shipped to Calcutta, where it was used with great success.

The first steam roller used in England was on the roads in Hyde Park in 1866. In September 1867, the borough authorities of Liverpool purchased from Messrs. Aveling and Porter their first steam road roller, which weighed 30 tons.

The first steam roller used in the United States was imported from England in the fall of 1868. This roller was first used in the United States Arsenal grounds, Philadelphia, Pennsylvania. At the present time, the term "steam roller" is somewhat of a

misnomer, as the recent developments in oil and gasoline engines have made this form of motive power practical.

The Stone Crusher.—The stone crusher was invented in 1858, by Mr. Eli Whitney Blake, of New Haven, Connecticut. Mr. Blake's crusher was used for the first time in Central Park in crushing stone for concrete. In 1859 the city of Hartford, Connecticut, purchased one of these crushers for use in the improvement of its streets and roads. This is the first application of mechanical power in the preparation of road metal.

Mr. Eli Whitney Blake was born in Westboro, Massachusetts, on the 17th of January, 1795. He was a nephew of Eli Whitney, the inventor of the cotton gin. In 1816 he graduated from Yale. For a time he studied law, but soon entered the manufacturing business. He died in 1886.

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MR. LEWIS W. PARKER, President, South Carolina Cotton Manufacturers' Association, Greenville, South Carolina
MR. JESSE TAYLOR, Jamestown, O.

The American Association for Highway Improvement was organized at Washington, D. C., November 22, 1910.

Its purposes are:

To correlate and harmonize the efforts of all existing organizations working for road improvement.

To arouse and stimulate sentiment for road improvement.

To strive for wise, equitable and uniform road legislation in every State.

To aid in bringing about efficient road administration in the States and their subdivisions, involving the introduction of skilled supervision and the elimination of politics from the management of the public roads.

To seek continuous and systematic maintenance of all roads, the classification of all roads according to traffic requirements, payment of road taxes in cash, and adoption of the principle of State aid and State supervision.

To advocate the correlation of all road construction so that the important roads of each county shall connect with those of the adjoining counties and the important roads of each State shall connect with those of adjoining States.

To strive for the utilization of convict labor on works of public improvement, where that course is consistent with the local policy, so as to involve the least possible competition with free labor, the utmost public benefit, and a healthy moral and physical development of the convict. In many States these results can be attained by using the convicts on road work or the preparation of road materials.

Constitution

ARTICLE I

Name

SECTION 1. The name of this organization shall be THE AMERICAN ASSOCIATION FOR HIGHWAY IMPROVEMENT.

ARTICLE II

Object

SECTION 1. The object of this Association is to harmonize and correlate all efforts for the improvement of the public roads, to the end that adequate and efficient systems of road construction, administration, and maintenance may be adopted in all of the States.

ARTICLE III

Location

SECTION 1. The official headquarters of this Association shall be located and maintained in the city of Washington, D. C.

ARTICLE IV

Membership

SECTION 1. The regular membership of this Association shall be composed of all persons who shall sign the roll of membership at the time of organization, or make written application to the Secretary and pay annual dues for one year in advance, membership to begin with written acceptance by the Secretary.

SEC. 2. The associate membership shall consist of all members of State and other organizations for road improvement, coöperating with this Association, *provided*, that a roster of such membership shall be filed with the Secretary by said organization.

SEC. 3. The sustaining membership shall consist of all persons or organizations who shall sign the roll of sustaining membership at the organization of this Association, or make written application to the Secretary and pay annual dues for sustaining membership one year in advance, membership to begin as soon as written acceptance shall have been received from the Secretary.

ARTICLE V

Officers

SECTION 1. The officers of this Association shall consist of a President, a Vice-President, a Treasurer, a Secretary, an Organizer, and a Board of Directors, to consist of the President and Vice-President of the Association and 23 additional members.

SEC. 2. The officers of the Association and the members of the Board of Directors shall be regular or sustaining members of the Association, and shall be elected at the first regular meeting and annually thereafter, except that the members of the Board, exclusive of the officers, shall be elected in three groups, the first to hold office for a period of three years, the second to hold office for a period of two years, and the third to hold office for a period of one year, vacancies on the Board to be filled annually thereafter.

ARTICLE VI

Committees

SECTION 1. There shall be four standing committees of this Association: An Executive Committee, consisting of five members; a Finance Committee; a Committee on Membership, and an Auditing Committee, consisting of three members. The members of the Auditing Committee shall be selected by the President at the first annual meeting, and shall hold office until the next regular meeting of the Association. The members of the other three committees shall be selected by the Board of Directors, and shall hold office until the next regular meeting of the Association.

ARTICLE VII

Amendments

SECTION 1. This Constitution may be amended at any regular meeting of the Association by three-fourths of the qualified voters present, *provided*, that the Secretary shall notify members of the Association of said regular meeting.

ARTICLE VIII

By-Laws

SECTION 1. The Board of Directors shall make such By-Laws for the government of the Association as it may deem necessary, and which shall not conflict with the provisions of the Constitution, and may amend or alter the same.

By-Laws

ARTICLE I

Annual Dues

SECTION 1. The annual dues for regular members of the Association shall be \$5, payable in advance. Annual dues for sustaining members shall be \$100, payable in advance. Associate members shall not be required to pay annual dues to this Association.

ARTICLE II

Voting Privileges

SECTION 1. Regular members of the Association shall be entitled to participate in its proceedings, and vote upon all questions that may come before the Association. Associate members shall be entitled to participate in discussions of questions before the Association, but shall only vote as duly accredited delegates from organizations coöperating with this Association, the basis of representation to be one vote for each 50 paid-up members of such coöperating organizations, as evidenced by rosters filed with the Secretary of this Association. Sustaining members shall be entitled to participate in discussions, and to vote upon questions before the Association.

ARTICLE III

Duties of Officers

SECTION 1. The President shall be the executive head of the Association. He shall preside at all meetings of the Association, and shall appoint an Auditing Committee and all temporary committees.

SEC. 2. In the absence of the President the Vice-President shall act in his place and stead, *provided*, that in the absence of both the President and Vice-President the Executive Committee shall immediately elect one of its members to perform the duties of the President.

SEC. 3. The Secretary shall keep the records and minutes of the Association. He shall draw all orders upon the Treasurer for the payment of money. He shall serve all notices and perform all duties necessary to the proper conduct of the business affairs of the Association, and shall perform such additional duties as may be assigned to him by the Board of Directors. He shall make written report annually of the work of the Association, and shall make such special written reports to the Board of Directors as they may require from time to time.

SEC. 4. The Treasurer shall be the custodian of the funds of the Association. He shall pay all orders for money duly signed by the Secretary. He shall make a written report annually to the Association, accounting for all funds received and disbursed. If the Treasurer shall for good and sufficient reason be temporarily unable at any time to perform the duties of his office, he shall so inform the chairman of the Executive Committee, who shall, with the concurrence of two other members of said committee, designate one of their members to perform the duties of Treasurer, until such time as the Treasurer shall resume his duties and so inform the chairman of the Executive Committee.

SEC. 5. The Organizer shall perform such duties as are assigned to him by the Board of Directors.

SEC. 6. The Board of Directors shall at its first meeting and annually thereafter elect a chairman. The Board shall have custody of all property of the Association; shall have charge of the financial affairs of the Association; shall provide ways and means for its expenses, shall appoint all regular committees and all officers not otherwise provided for, shall have supervision and control over all work carried on by the Association and its officers, and shall fill all vacancies in its own membership and among the officers of the Association between the meetings of the Association.

ARTICLE IV

Duties of Committees

SECTION 1. The Executive Committee shall act for the Board of Directors and exercise all the powers of said Board in the interim between the meetings of said Board, and shall report quarterly to the Board the condition of the Association and its work.

SEC. 2. The Committee on Finance shall provide for the raising of funds to carry on the work of the Association and shall have supervision over the financial affairs of the Association.

SEC. 3. The Committee on Membership shall deal with all questions relating to membership in the Association, and shall take such steps as it may deem advisable for increasing the membership of the Association.

SEC. 4. The Auditing Committee shall audit and review the reports of the Secretary and the Treasurer.

ARTICLE V

Meetings

SECTION 1. Regular meetings of the Association shall be held annually at such time and place as the Board of Directors may determine. Special meetings may be called by the Board of Directors, or by two-thirds of the regular members of the Association.

SEC. 2. The Board of Directors may fix the time and place of its meetings, provided that it shall meet at least once in each year.

SEC. 3. The Executive Committee shall fix the time and place of its meetings, provided that it shall meet at least once in each three months.

ARTICLE VI

Quorums

SECTION 1. A quorum of the Association shall consist of fifty members who shall be present in person or by proxy, *provided*, that no member shall hold proxies for more than five members.

SEC. 2. A quorum of the Board of Directors shall consist of five members who shall be present in person.

SEC. 3. A quorum of the Executive Committee shall consist of a majority of its members.

ARTICLE VII

Amendments

SECTION. 1. The By-Laws of this Association may be altered or amended by the Board of Directors, at their discretion, *provided*, that such By-Laws shall not conflict with the provisions of the Constitution.

Working Plan

In addition to its volunteer non-paid workers, the Association has a small corps of thoroughly competent salaried men whose duties are: to appear before State legislative committees, on invitation, and give advice on pending road legislation; to address conventions and local meetings in advocacy of needed reforms in road improvement; to organize and prepare working plans for local road improvement associations; to prepare articles of educational and news value for the use of the press in arousing, stimulating and directing public sentiment.

The Association is continually assembling data concerning the progress and status of the road movement, embracing road legislation, bond issues, mileage and cost of roads, organization work, etc.

Annually the Association holds a Road Congress for the discussion of problems of road construction, maintenance and administration, and for correlation and coördination of the work conducted by the various State and Interstate road organizations.

The Association coöperates with railroad companies and the national government in educational campaigns through the medium of "Good Roads Trains." Under this plan the government provides a miniature working exhibit illustrating types of roads and methods of construction, a stereopticon with slides, and assigns one or more demonstrators to accompany the train at government expense for salary, travel and subsistence. The Association at

its own expense provides an experienced organizer who organizes in each county traversed, a practical association and suggests a constitution and a working plan for it. The plan in general is as follows:

It is suggested that as soon as the organization has been completed, a constitution and by-laws adopted and permanent officers elected, working committees should be selected whose distribution of duties and responsibilities should be somewhat as follows:

(a) *Committee on Road Administration.*—This committee should ascertain the laws upon which the road administration of the county or locality are based, the personnel of the official organization selected to carry out such laws, the revenues available for road purposes, how obtained, how expended, and what system of accounting and recording is followed. It should recommend needed reforms in road laws, organization and administration; it should ascertain the various sources of revenue and plans for raising additional revenues; and should eventually formulate its findings into a report containing recommendations for the future financing of road work.

(b) *Committee on Road Materials.*—This committee should ascertain the location, character, quantity and availability of all road materials in the county. This work can be much facilitated by coöperation with the Office of Public Roads of the United States Department of Agriculture, which makes analyses and tests of road materials free of charge, whereby the kind and quality of road building material can be definitely ascertained. The committee should also make a study of transportation facilities for road materials, and work out plans whereby the county or locality can obtain the best materials in the easiest and most economical manner. They might consider the advisability of the purchase of quarries and gravel pits, the arrangement of special rates with the railroad companies, the preparation of the materials by county prisoners, etc.

(c) *Committee on Road Construction and Maintenance.*—This committee should ascertain the mileage of public roads, and classify them according to amount and importance of traffic, ascertaining the improvement that is necessary and the probable cost; draw up a general plan for the gradual improvement of all the county roads along definite, intelligent lines, according to the means available; obtain data bearing upon all phases of road construction; and should coöperate closely with the committee on road materials in drawing up its recommendations as to the kind and amount of road construction to be undertaken. It should make a close study of road maintenance, with a view to introducing the best and most economical methods for maintaining the roads. It should look into the relative merits of the various kinds of road

equipment, and aid the county authorities by information and advice in securing the necessary equipment.

(d) *Committee on Earth Roads.*—This committee should devise ways and means for stimulating interest in the road drag, and should endeavor to bring about the general use of this simple little implement. Records could be kept of the number of drags in use, and the mileage of roads regularly dragged as the result of the work of the committee. Contests could be inaugurated and publicity given the work, so that the interest might become widespread, and practical results accomplished.

The Association plans to issue instructive publications from time to time, in addition to the Year Book, including the papers read and proceedings had at the Annual Road Congress.

The foregoing specific examples indicate *in part* the *methods* by which the Association is endeavoring to carry out its purposes. New methods and new lines of activity frequently develop and are utilized as far as practicable.

Work of the Past Year

The Association coöperated with the Southern Railway Company, the Atlantic Coast Line and the M. K. & T. Railway Company in the operation of good roads trains and is now coöperating with the Frisco System along similar lines.

The officers of the Association addressed numerous meetings including legislative conferences.

News and educational articles were prepared and sent to newspapers and magazines at the rate of three or four a month, with the result that the subject of road improvement was kept before the public with a thoroughness and persistence never before known in this movement. *The Saturday Evening Post* of March 4, 1911, contained a two-page illustrated article on the Association and its work.

The American Road Congress, held at Richmond, Virginia, November 20–23, 1911, marked the completion of the first year's work. Upwards of 900 delegates were actually registered, while the attendance was well over 1200. Many of the foremost men of the nation gave addresses, which will be included in the proceedings soon to be published.

At the American Road Congress steps were taken which will lead to the holding of a joint road Congress each year to be participated in by the American Automobile Association, the American Road Builders, the National Association of Road Machinery and Material Manufacturers, and the American Association for Highway Improvement.

Representatives of the Association have organized about 150 local associations. Thirty of the leading road organizations of the country have affiliated with this Association as shown by the list of associate membership.

In Florida a representative of the Association made a 3200 mile trip organizing local associations, stimulating interest in road improvement, and giving practical information.

Sustaining Members

Miss Grace E. Arents	Kelly-Springfield Road Roller Company
American Asphaltum and Rubber Company	Mr. Bryan Lathrop
Association of American Portland Cement Manufacturers	Mr. J. H. Lapham
Atlantic Bitulithic Company	Mr. James Laughlin, Jr.
Austin-Western Company	Murphy's Hotel of Richmond, Virginia
Barber Asphalt Paving Company	Monarch Road Roller Company
Mr. W. T. Beatty	Mr. W. W. Mackall
Barrett Manufacturing Company	Mr. Alfred Noble
Mr. Andrew Carnegie	National Paving Brick Manufacturers' Association
J. I. Case Threshing Machine Company	Mr. Earl W. Oglebay
Chamber of Commerce of Richmond Virginia	Mr. Daniel T. Pierce
Mr. H. J. Cullinan	Mr. Thomas Nelson Page
Mr. J. S. Cullinan	Robeson Process Company
Mr. Charles Henry Davis	Seaboard Air Line
Mr. John J. Duff	Southern Pacific Company
Gen. T. Coleman du Pont	Standard Oil Company
Mr. Pierre S. du Pont	Southern Bitulithic Company
El Paso & Southwestern R. R. Company	Sun Company
Good Roads Machinery Company	Solvay Process Company
Mr. James S. Harlan	Mr. Leonard Tufts
Indian Refining Company	Texas Company
International Harvester Company	Universal Portland Cement Company
Ingersoll-Rand Company	Union Pacific Railroad Company
Illinois Central R. R. Company	Watson Wagon Company
Mr. Joseph W. Jones	Wadsworth Stone and Paving Company
Jefferson Hotel, Richmond, Virginia	Warren Brothers
Col. Robert M. Thompson	Charles Warner Company
	Mr. Robert F. Whitmer
	West Virginia State Board of Trade

Regular Members

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Mr. Joseph L. Anderson	Mr. B. F. Affleck
Mr. Charles B. Alexander	Mr. Patrick H. Anderson
Mr. Herbert L. Alexander	Mr. W. H. Aston
Mr. Otto Abeling	Mr. Jas. L. Autry
Auburn Wagon Company	Mr. Byron S. Adams
J. D. Adams & Company	A. G. Anthony & Son

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 Mr. R. B. Allport
 Mr. Otis M. Alfriend
 American Hoist & Derrick Company
 Mr. George E. Amos
 Mr. Howard D. Atha
 Mr. Ernest F. Ayres
 Mr. S. B. Avis
 Asheville Motor Club
 Mr. S. T. Atkinson
 Mr. Henry W. Anderson
 Mr. David G. Anderson
 Mr. Fritz Achelis
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 Judge W. R. Bennett
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 Mr. J. G. Burnley
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 Brig. Gen. W. H. Bixby, U. S. A.
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 Mr. S. O. Billings
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 Bloch Brothers
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 Blodgett Construction Company
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 Mr. William P. Carter
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 Mr. Samuel Cohen
 Dr. Allerton S. Cushman
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 Mr. C. J. Cooper
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 Mr. J. M. Culp
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 L. C. Chase & Company
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 Chalmers Motor Company of
 Missouri
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 Mr. Thomas Hyde
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 Mr. Archer B. Hulbert
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 Mr. Arch'd. H. Huston
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 Mr. William Hague
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 International Motor Company
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 Mr. Malcolm Jackson
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 Mr. W. K. James
 Mr. Robert Jemison, Jr.
 Mr. Thomas F. Jeffries
 Mr. James Ellwood Jones
 Mr. Isaac B. Jones
 Mr. Hennen Jennings
 Mr. Edwin P. Jones
 Miss A. B. Jennings
 Dr. E. J. James
 Mr. W. M. Jacobus
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 Mr. Rupert C. King
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 Mr. William V. Kelley
 Mr. Warren B. Kittle
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 Mr. Clarence A. Kenyon
 Mr. Robert F. Kidd
 Mr. W. S. Keller
 Mr. D. A. Kennedy
 Mr. T. Edmund Krumbholz
 Mr. William H. Kershaw
 Dr. Edward L. Keyes

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Kansas City Auto Supply Company	Mr. Lee McClung
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Mr. Fred W. Kelley	Mr. F. A. McDonald
Mr. E. C. Lufkin	Mr. James H. MacDonald
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Mr. Ott Laughlin	Dr. R. R. McVettie
Mr. Arthur Lincoln	Mr. J. R. McQueen
Mr. Virgil A. Lewis	Mr. J. A. MacLane
Mr. Cameron Lewis, Jr.	Mr. Isaac T. Mann
Mr. George M. Landers	Mr. Edward Mann
Mr. William H. Lewis	Mr. Henry MacNair
Mr. John S. Larcombe	Mr. J. R. Manning
Mr. Lawrence R. Lee	Mr. James H. McGraw
Mr. Walter Learned	Mrs. Sue H. Mims
Mr. Alexander B. Legare	Mr. Barry Mohun
Mr. S. Dana Lincoln	Mr. Louis B. Magid
Mr. Arthur Lee	Mr. George N. Moore
Mr. Alvin M. Lothrop	Mr. Lilburn T. Myers
Mr. Blair Lee	Mr. Milton E. Marcuse
Mr. J. E. Lane	Mr. James R. Marker
Mr. Egbert G. Leigh, Jr.	Mr. A. E. N. Means
Mr. W. H. Lewis	Mr. L. Mallonee
Mr. Charles P. Light	Dr. James Dudley Morgan
Lexington Hotel, Richmond, Va.	Mr. Haymond Maxwell
Mr. George Long	Mr. A. D. Martin
Mr. H. Lloyd	Mr. Lee Maxwell
Mr. Lewis H. Lapham	Mr. W. Brent Maxwell
Mr. A. T. Lincoln	Mr. E. W. Martin
Mr. John C. Louis	Mr. Walton Miller
Mr. C. F. Lucas	Mr. Robert Mather
Mr. Owen Lilly, Sr.	Mr. L. C. Massey
Mr. J. H. Long	Judge Wm. N. Miller
Mr. George M. Lilley, Sr.	Mr. J. H. Marsteller
Mr. Richard T. Lowndes	Mr. Edwin O. Meyer
Mr. Daniel B. Luten	Mr. F. Lawson Moores
Mr. George W. Lutz	Mr. Ed. A. Merydith
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ROAD LEGISLATION IN THE UNITED STATES

(To December 31, 1911, inclusive)

National Legislation.—With the exception of appropriations for the improvement of roads on government reservations, Congress makes no regular annual appropriations for the construction and maintenance of roads.

Office of Public Roads, United States Department of Agriculture.—Appropriation for the fiscal year ending June 30, 1912. Statutory salaries, which includes the salary of the director, who is required to be a scientist, and the salaries of the general office force, \$34,020.00.

General Expenses, Office of Public Roads.—For salaries, and the employment of labor, and rent in the city of Washington and elsewhere, supplies, office fixtures, apparatus, traveling and all other necessary expenses for conducting investigations and experiments, and for collating, reporting, and illustrating the results of same, and for preparing, publishing, and distributing bulletins and reports as follows: *Provided*, That no part of these appropriations shall be expended for the rent or purchase of road-making machinery, except such as may be necessary for field experimental work as hereinafter provided for:

For inquiries in regard to systems of road management, throughout the United States and for giving expert advice on this subject, \$20,000.

For investigations of the best methods of road making and the best kinds of road-making materials, and for furnishing expert advice on road building and maintenance, \$60,000.

For investigations of the chemical and physical character of road materials, \$25,000;

For conducting field experiments and various methods of road construction and maintenance, and investigations concerning various road materials and preparations; for investigating and developing equipment intended for the preparation and application of bituminous and other binders; for the purchase of materials and equipment; for the employment of assistants and labor; for the rental and erection of buildings; such experimental work to be confined as nearly as possible to one point during the fiscal year, \$10,000;

For general administrative expenses connected with the above-mentioned lines of investigations and experiments, \$11,700;

In all, for general expenses, \$126,700.

Total for office of public roads, \$160,720.

ALABAMA

Constitution.—The State shall not engage in works of internal improvement nor lend money or its credit in aid of such;

The legislature shall not pass special, private or local laws authorizing any county, city, town, district or other political subdivision of a county to issue bonds or other securities unless they shall have been authorized before the enactment of such law, by a vote of the qualified electors, at an election held for such purpose.

The legislature shall not, in any one year, levy a greater rate of taxation than 65—100 of 1 per cent on the value of the taxable property of the State.

No county, city, town, village or other municipal corporation shall be authorized to levy a greater rate of taxation in any one year than one-half of 1 per cent on the value of the taxable property therein; except, that an additional levy may be made to pay debts existing on the sixth day of December, 1875, and also any debt or liability now existing against any county or that may be hereafter created, for the erection of necessary public buildings, bridges or roads.

No county shall become indebted in an amount, in the aggregate, exceeding $3\frac{1}{2}$ per cent of the assessed value of the property therein; nor shall any city, town or other municipal corporation, having a population of less than 6000 become so indebted in excess of 5 per cent of the assessed value of the property therein; and cities or towns having a population of 6000 or more may become so indebted not to exceed 7 per cent of the assessed valuation of the property therein.

In August, 1907, an amendment was voted to the constitution authorizing and empowering the legislature to appropriate a portion of the whole of the net revenue, derived from the convict fund, for the improvement of the public highways of the State.

Local Administration.—The court of county commissioners consists of a judge of the probate court and four other commissioners from the county at large, except that by special statute boards of revenue or other like boards may be created to take place of boards of commissioners—with all the powers of such commissioners court.

The court of county commissioners has charge of all public highways, bridges, causeways and ferries and may levy a special tax to build or repair them.

The court of county commissioners may at any time divide the county into a convenient number of road precincts and appoint one or more apportioners for each election precinct, who shall appoint an overseer to each road precinct. The apportioners and overseers can not serve more than four years from date of appoint-

ment, and shall be entitled to a certificate of exemption from road service for two years after the expiration of their term of service.

Upon failure of the court to act, or in case of a vacancy, the judge of probate appoints apportioners. The apportioners must fill all vacancies in the office of overseers in their respective precincts.

The court of county commissioners may appoint a supervisor of the public roads, who shall be a competent civil engineer and shall receive compensation not to exceed \$5 per day for each day actually employed in the discharge of his duties. Acts allowing bond issues usually provide that the court of county commissioners or revenue may elect an engineer and fix his salary.

The said supervisor shall make surveys, grades, maps, plans, etc., of all road and bridge work that may be required or directed by the court of county commissioners; shall superintend and direct the overseers, contractors, employes, etc., in constructing and maintaining the public roads, bridges, culverts, drains, etc.

The court of county commissioners or board of revenue may, at any time, remove road supervisors, apportioners or overseers from office and appoint their successors, for any cause which it may deem sufficient, by order spread on its minutes.

Statute Labor.—Within fifteen days after appointment, the apportioners must make a list of all those who are liable to road duty and within twenty days, must apportion the hands among the overseers. Within five days thereafter, they must furnish a list to each overseer of the hands assigned to him. They must also inspect the roads in their precincts and see that they are regularly posted and properly cared for. All apportionments of hands shall be subject to revision by the court of county commissioners.

It is the duty of the overseers to call out, at their discretion, the hands assigned to them, and to work with them on the roads ten days each year, if necessary to keep the roads in the respective precincts in good repair. They shall measure the roads in their respective precinct within three months after their appointment and set up mile posts with the number of miles to the court house or other noted place to which the road may lead; at the cross-roads index boards shall be erected, and they shall build bridges and causeways, when necessary, unless the court of county commissioners shall have the same built by contract. They shall perform such other duties as may be necessary.

Road Taxes.—The courts of county commissioners may divide their respective counties into road districts for the purpose of ordering an election therein upon the question of levying a special road tax, of not to exceed one-fourth of 1 per cent, on the taxable property in such district, or the said county court may hold a

county election to determine the levying of a similar tax for the entire county. A majority vote is necessary to authorize the levy of such tax (L. 1903, p. 412; L. 1907, p. 701).

The court of county commissioners or board of revenue of any county may transfer to the road fund of the county any surplus of general funds of the county in the county treasury, or any part of such surplus, whenever it will promote the interests of the county to make such transfer. Any such surplus so transferred shall be used for working the public roads or building bridges, or otherwise improving the public roads, as the said court or board of revenue may determine (Code of 1907, sec. 5766).

Poll Tax.—All males between the ages of eighteen and forty-five are subject to road duties, except those who have lost a limb or who by nature of disease are incapable of hard labor and who present a certificate from the county board of health or from a practicing physician.

Ten days work from those liable to road duty may be required, but not upon any road or bridge, all of which is distant six miles from their residence. This labor tax may be commuted by the payment of \$10 per year.

Contracts.—The court of county commissioners, may after due advertisement, let to contract the construction or maintenance of any bridges, roads, ferries, culverts, drains, etc., and shall require any such contractor to execute bond payable to and to be approved by the probate judge, in an amount not less than twice the amount to be received by him for such work.

Toll Roads.—The court of county commissioners may authorize gates to be erected across the public roads, under proper restrictions, and may also fix and regulate tolls on all toll bridges and ferries in their respective counties.

Convict Labor.—The convicts of any county or municipality may be worked upon the public roads, bridges or ferries of the county under the direction of the court of county commissioners or they may be hired to contractors. Provided, that convicts shall not be worked in squads or companies with other persons liable to road duty upon public roads, bridges, etc.

State Aid.—The State highway commission consists of a professor of civil engineering in the Alabama Polytechnic Institute, to be selected by the board of trustees of said institute, the State geologist and three civilians to be appointed by the governor and hold office for four years; all vacancies in the membership of said commission shall be filled in the same manner as prescribed for the regular appointment. The governor may remove any member for inefficiency, malfeasance or neglect of duty. The commission is provided with an office at the State capitol. A State highway engineer shall be elected by the commission who shall

be a competent civil engineer and experienced and skilled in highway construction and maintenance. He shall hold his office subject to the pleasure of said commission, and his salary shall not exceed \$4000 per annum.

The said State highway commission and the said State highway engineer shall constitute said State highway department. The said commission shall hold regular meetings at such times and places, as they may deem essential in the proper discharge of their duties.

With the consent and advice of the commission, the State highway engineer may employ a stenographer and such assistant engineers as may be, from time to time, necessary, and fix their compensation. The said State highway engineer shall be required to give a bond of \$5000 before entering upon his duties. He shall keep a record of every vote and official act of said commission; he shall keep on file all the maps and papers belonging to the commission, and shall devote all of his time to the interest of the public roads, culverts and bridges of the State, and he, or his assistants, shall give such advice and assistance to counties throughout the State as time and conditions will permit.

The said engineer and his assistants shall be allowed their necessary traveling expenses, while performing their official duties, and the railroads in operation in the State are authorized to furnish free transportation to the members of the State highway commission, and its employes while in the actual performance of their official duties.

The attorney-general of the State shall be ex-officio attorney for the commission, and shall receive, in addition to his regular salary, his traveling expenses when in the performance of his duties as ex-officio attorney for the commission.

Said highway engineer shall cause to be made and kept by the State highway department a general highway plan of the State; shall collect information and prepare statistics relative to the mileage, the character and condition of the highways and bridges in the different counties in the State; and shall, within two years from the passage and approval of this act, prepare a map of such of the main highways in the State, as, in his judgment, are of sufficient importance to be designated as a system or trunk or State roads that may be improved and maintained at the cost of the State, in coöperation with the counties and report the same to the highway commission for submission to the legislature for adoption as a proposed system of trunk or State roads.

He shall determine the character and have the general supervision of the construction and repair of all roads and bridges improved under the provisions of this act.

It shall be the duty of the State highway commission to con-

sider at their meetings all questions relating to the general policy of the said State highway department, and the conduct of the work in general, and to act for the State highway department in all matters pertaining to recommendations, estimates and appropriations, and such other matters as it may be found reasonable to submit to the governor or the State legislature. On or before the first day of April of each year, it shall be the duty of the commission to submit a printed report to the governor, covering all operations of the department during the year. When practicable, the said commission shall investigate the location of road materials in the State and in the study of same, shall have the coöperation of the State geologist and the professor of civil engineering of the Alabama Polytechnic Institute. All expenses of said State geologist or professor of civil engineering, while thus officially engaged, shall be paid, in addition to their regular compensation allowed by law.

An annual appropriation of \$154,000 is made for State aid and the support of the State highway department, provided that the expense of the highway department, including the salary and traveling expenses of the commission, highway engineer, stenographers or other persons employed, does not exceed \$10,000, unless in the opinion of the governor, the public demands on the highway department, shall require an additional sum, in which event, he may at his discretion increase the amount not to exceed \$20,000. This appropriation is made from the convict fund, provided that after the first year beginning in 1912 all special funds for the improvement of the public roads, culverts and bridges in Alabama, which may accrue from any other source and be in the State treasury shall be in lieu of said convict fund hereinabove provided for to the extent of the amount thereof, thereby relieving said convict fund to such extent.

The appropriation hereinabove made less the actual expenses of the commission, hereinabove defined, shall inure to the equal benefit of every county in the State of Alabama, and shall be apportioned equally by the said highway commission in such way as to give each county an equal share of said funds. Said commission shall apportion the same among the different counties on or before the first day of February of each year, and shall notify the probate judge of each county to such effect. No money, however, shall be drawn from the State road fund by any county, until the said county shall have appropriated and rendered available a sum of money equal in amount. Whenever any county shall decide to use the funds appropriated to it, the county commissioners or boards of revenue or other proper authorities, shall make written application to the State highway commission and the said State highway engineer shall investigate and either approve or disapprove such application.

Rules and regulations for the construction, improvement and maintenance of public roads, culverts, and bridges shall be formulated by the highway commission and shall be printed and several copies be forwarded to the probate judge and the county commissioners. Such rules and regulations may be amended from time to time.

No member of the highway commission, the State highway engineer or any other person in the employ of the highway commission shall be, either directly or indirectly, interested in any contract for construction, improvement or maintenance of any road, culvert, or bridge under this act, or in the sale of any machinery, material or anything whatever entering into such work.

The State highway engineer shall furnish a competent engineer, where needed, during the progress of construction in any county, who shall supervise said work and see that plans and specifications are provided and complied with. Whenever the cost of any one piece of work, for which State aid is required, shall exceed \$3000, the highway engineer with the consent and advice of proper authorities in the county, may prepare plans and specifications for advertising for bids. The county commissioners or boards of revenue or other proper authorities in such county shall receive bids for all or a part of said work and let the contract to the lowest bidder, subject to the approval of the said state highway commission, reserving the right, however, to reject any and all bids and call for new bids, or perform the work or part of said work by day labor or convict labor, as may be deemed to the best interests of the State and county, subject to the approval of the State highway engineer. Where any work is done by contract, the state highway commission shall require a bond from the contractor in an amount double the contract price. The highway engineer may authorize partial payments to any contractor performing any highway or bridge improvement, under the provisions of this act, as the same progresses.

When ever any road shall be improved, under the provisions of this act, it shall be the duty of the commission to prescribe rules and regulations under which the State highway engineer shall hereafter require all such roads to be kept in proper repair, and should any county fail or refuse to carry out any reasonable recommendation of the State highway engineer in the maintenance of such road, the commission may prescribe rules by which the same may be done by the State and the expense therefor shall be paid by the county or may be paid, in the event the county defaults, out of any money due or to become due to said county, under the provisions of this act.

No highway, under the provisions of this act, shall be dug up or otherwise used for laying lines, sewers, poles, or railways, or

for other purposes, without the written permit of the proper authorities of such road in such counties, approved by the State highway engineer. The right of ways are required to be acquired by the counties.

If in the opinion of the governor the condition of the treasury shall warrant the same, he is hereby authorized to increase the amount herein appropriated for any year to a sum not to exceed \$4000 per annum to each of the several counties in the State, provided that the counties shall each appropriate a like amount, as provided for in this act.

All roads and highways built under this act are and shall be in perpetuity, free of toll.¹

ARIZONA

State.—The State engineer is appointed by the governor with the consent of the council and holds office for two years. He is required to be a practical competent civil engineer and he is allowed salary of \$3000 per annum with actual traveling expenses not to exceed \$2500 per annum. He is required to give bond approved by the governor in the sum of \$5000.

Board of Control.—The governor and auditor of the State and one citizen who shall be appointed by the governor with the advice and consent of the council, and who shall hold his office for two years, and shall be ex-officio secretary, shall constitute a board of control, who shall have full charge of all charitable, penal and reformatory institutions that now exist in the State or that may hereafter be created including the capitol building and grounds. Not more than two members of said board shall belong to the same political party.

The governor shall be allowed no compensation for any services rendered as a member of the board of control. The citizen member of said board provided for in this chapter shall receive a salary of \$1800 per annum and actual traveling expenses incurred in the discharge of his duties, to be paid monthly out of the treasury, and he shall devote his sole time to the discharge of the duties devolved upon him by this chapter: Provided, that before entering upon the duties of his office he shall give a good and sufficient bond in the sum of \$10,000 conditioned on the faithful discharge of his duties, such bond to be approved by the governor. All bills for salary clerk hire and expenses shall be paid monthly and it is hereby made the duty of the auditor to audit said claims and draw a warrant on the treasury for the same.

¹ Digest revised and approved by Mr. W. S. Keller, State highway engineer, March 1, 1912.

The auditor shall hereafter receive a salary of \$1800 per annum and actual traveling expenses while in the discharge of his duties, which shall be in full for his services as auditor and member of the board of control.

A sum of money sufficient to carry out the provisions of this chapter is hereby annually appropriated out of the general fund.

Duties of Board of Control.—They shall require the State engineer to select map, plat, and furnish estimates of cost of State highways and shall designate such roads as they may deem proper and expedient to construct and maintain as State highways. They shall fix the amount of State road tax to be levied by the State auditor in the several counties within the limits of assessment as explained under "State Road Revenues." The board of control may adopt plans and specifications for State highways and it shall then be their duty to advertise for bids, contracts to be awarded to the lowest responsible bidder but the board shall have the right to reject any and all bids and they shall also prescribe the contract which the successful bidder shall enter into with the State of Arizona. The board of control may enter upon any land adjacent to State highway for the purpose of opening or constructing a drain or ditch to properly drain said highway and they may agree with the owner of said lands for the payment of damages as well as damages for the taking and using of rock, earth or timber. If they cannot agree the damages shall be ascertained as provided for in the condemnation law.

State Road Revenues.—A levy not to exceed 25 cents on each \$100 of assessed valuation is made in counties where State highways are constructed and maintained, and a levy not to exceed 25 cents on each \$100 of assessed valuation in counties in which no road work is being done or to be done on State highways, and the proceeds are placed in a fund known as the "State road fund." All State highways and bridges under the provisions of this act are constructed and maintained entirely at the cost of the State.

The State auditor is required to keep an accurate account of all moneys received for and expended out of the State road fund and shall keep all contracts and preserve all documents and papers that may be filed with him in connection with such highways and bridges.

Duties of State Engineer.—All highways and bridges constructed or improved under the terms of this act are known as State highways and bridges and they shall be improved and maintained according to plans and specifications made by the State engineer. He shall aid the board of control in such manner as they may require in the selection and designation of State highways, and in constructing and maintaining the same at the expense of the State of Arizona. He shall also aid the county superintendents of roads by

giving advice. All work done upon the State highways and bridges shall be under the supervision of the State engineer. The State auditor shall draw warrants for the payment of amounts due contractors only upon certificate from the State engineer.

Local Road Legislation.—The board of supervisors of each county shall appoint a county superintendent of roads, who shall have charge of all public roads and highways in the county, subject to the orders of the board of supervisors.

Taxes are not assessed in labor.

Taxes levied on property for road purposes can not be worked out.

The board of supervisors may levy a tax of not to exceed 25 cents on each \$100 of real and personal property in the county for road purposes.

There is no authority for the issuance of road bonds.

A road poll tax of \$2, payable in cash, shall be assessed against every able-bodied male resident, between twenty-one and sixty years of age.²

ARKANSAS

Constitutional.—Neither the State nor any county, city, town or other municipality shall ever loan its credit for any purpose whatever, nor shall any county, city, town or other municipality ever issue any interest-bearing evidences of indebtedness, except such bonds as may be authorized by law to provide for and secure the payment of the present existing indebtedness.

The general assembly shall not have power to levy State taxes, for any one year, to exceed, in the aggregate, 1 per cent of the assessed valuation of property in the State for that year. No county shall levy a tax to exceed one-half of 1 per cent of the assessed valuation of property, for all purposes. (Con. '74, art. 16, sec. 1, 8 and 9).

The county court, together with a majority of the justices of the peace of such county, in addition to the amount of county tax allowed to be levied, shall have the power to levy, not exceeding 3 mills on the dollar, on all taxable property in their respective counties, which shall be known as the county road tax, which shall be used for making and repairing public roads and bridges in the county, and for no other purpose. Such levy shall only be made when a majority of the qualified voters of such county shall have voted favorably thereto, at the general election for state and county officers, next preceding. (Con. 74, art. 23, amendment 5).

Statutory.—The public roads, running most centrally through the county and which are used most by the public, shall be desig-

² Digest revised and approved by Mr. J. B. Girand, State engineer, December 29, 1911.

nated as first class rods. All other public roads are second class roads. First class roads are to be worked first and second class roads are to be worked as the county court shall order.

Administration.—The supervision and control of the public highways vests with the county court. The said county court shall lay off and divide the county into road districts and shall appoint one overseer for each district each year, at a salary of \$1.50 per day for time actually employed.

If the electors of a county vote a public road tax, as provided for in amendment 5, article 23, of the Constitution, the county court may employ one resident householder of the county as road commissioner, to receive a salary \$2 per day when actually employed (Kirby's *Digest of Statutory*, 1904, ch. 139).

A law was passed, May 25, 1897, making it optional with the county court to declare each township a road district, with the qualified voters thereof to elect a road overseer as other township officers are elected.

Taxation.—If a majority of the electors of the county have voted a public road tax at the next preceding general election, the county court together with a majority of the justices of peace of the county, shall levy not less than $2\frac{1}{2}$ nor more than 3 mills on the dollar, as a road and bridge tax (Kirby's *Digest of Statutory*, 1904, ch. 139, sec. 7330, as amended, L. 1905).

Each male person, between the ages of twenty-one and forty-five, except such as are exempt by law, must work four days on the roads and bridges in his district, or pay to the overseer \$1 per day in lieu, thereof (Act, May 8, 1899, as amended May 4, 1903).

Convict Labor.—County convicts may be worked upon the public highways (Kirby's *Digest of Statutory*, 1904, ch. 37, sec. 1066-1104).

Road taxes may be worked out at the rate of 75 cents per day, after the time required by statute is worked out.

(In 1911, it appears that a motor vehicle law was enacted, but the provisions of this law are not available).

Road Improvement Districts.—Upon petition of a majority of the property owners in a county or part of a county; the county court shall, after public notice, investigation, and hearing, make an order declaring the area covered by said petition to be a road improvement district and shall appoint three persons therein who shall compose a board of directors each of whom shall receive \$3 per day for time actually engaged. The said board of directors shall have full authority in the construction, maintenance and repair of roads within their district, shall make contracts, expend money, etc., but shall not create liabilities, which exclusive of interest, shall exceed 30 per cent of the total assessed value of property in said districts. As soon as the board forms a plan of improve-

ment and ascertains the cost thereof, it reports, to the county judge who appoints three electors of the county as a board of assessment, who shall assess the benefits and burdens on the property within the district. No local assessment shall in any one year exceed 25 per cent of the assessed benefits accruing to said property.³

CALIFORNIA

State Highway Officials.—A department of engineering consisting of an advisory board, composed of the governor, who is ex-officio chairman; a State engineer, who is the chief executive officer of the department; the general superintendent of State hospitals; the chairman of the State board of harbor commissioner of San Francisco; and three "appointed members," has authority over State highways and all participation by the State in works of highway improvement. The State engineer is appointed by the governor and his salary is \$5000 per annum. The governor also appoints a highway engineer, salary \$10,000 per annum and the State engineer, the appointed members and the highway engineer all hold office at the will and pleasure of the governor.

Other State Officials.—The State board of prison directors has full control of the rock crushing plant at the State prison at Folsom and may sell or dispose of the crushed rock for highway purposes at cost of production plus 10 per cent, provided no rock shall be sold for less than 30 cents per ton, preference to be given to orders from State highway authorities.

Duties of State Highway Officials.—The department of engineering has full charge of all State highways; all public works formerly under the direction of the department of highways; all expenditures of the State for highway purposes and all money appropriated for such purposes shall be made payable upon the order of the department. The department is authorized to examine highway conditions in the State and make such other investigations as it deems desirable. The department is given full authority to select the routes of the State highway system hereinafter described and to determine the character of materials to be used, make all purchases and do all things necessary in the construction and maintenance of said State highway which shall be permanently maintained and controlled by the State of California.

By a resolution of the department of engineering the appointed members were constituted a committee known and designated as the "California Highway Commission" with the following jurisdiction and powers:

³ Digest submitted to Hon. Hal. L. Norwood, attorney-general, and returned by him March 8, 1912.

RESOLVED: that the appointed members of this board, to wit:—Messrs. Charles D. Blaney, Burton A. Towne, and N. D. Darlington, be and they are hereby appointed a committee to be known and designated as the "California Highway Commission," with the jurisdiction and powers following; to wit:

(1) To take full charge of the entire matter of the construction and acquisition of a system of State highways in and for the State, as and in the manner provided by law, at a cost not to exceed the sum of \$18,000,000 under and in pursuance of the act of the legislature of the State of California approved, March 22, 1909, and known as the State highway act, and to do and perform as fully and completely as may be done by any part, or representative, or committee of this advisory board, every act and thing that may be requisite to be done and performed in connection with the highways of the State of California, or that ought to be done and performed under the said State highway act.

(2) To do and perform every act and thing in and about the premises that a committee of this board may be lawfully authorized to for or on behalf of this board; and to have full charge and control of the acquisition and construction of the laying out and the building of a system of such highways.

(3) To report from time to time to this board their actions and proceedings and to submit to this board for determination such matters as the law requires this board to act upon; and to superintend the work and operations of the highway engineer whose appointment is provided for by the act of the legislature of the State of California, approved April 8, 1911.

(4) To perfect such organization as they may deem necessary to carry on with celerity and efficiency the work to be done in the matter of the acquisition and construction of the said system of State highways, and under said State highway act; and generally to do all and singular every act and thing that may be necessary for the due, speedy and efficient performance of all that may be required under the said State highway act, and under the said act of the legislature of the State of California, approved.

April 8, 1911.

The highway engineer reports to the California highway commission.

State Bond Issue.—The legislature of 1909 passes an act which was ratified at the general election in 1909 authorizing the issuance of \$18,000,000 in bonds for the acquirement and construction of a continuous and connected system of State highways, running north and south traversing the Sacramento and San Joaquin Valleys and along the Pacific coast connecting the county seats lying east and west of such highway. These highways are to be permanent in character. Each county must pay into the State treasury, annually, a sum equal to the interest at 4 per cent, upon the entire sum of money expended within such county in the construction of said State highway, less such portion of the amount so expended as the bonds matured shall bear to the total number of bonds sold and outstanding.

Revenues other than Bond Issues.—Special appropriations are made to construct and maintain the State roads exclusive of the State highway system above described. California has eleven State

roads cared for in this manner, all of which are in the mountainous country and in localities too poor financially to pay for their building and upkeep.

County Roads.—Boards of supervisors of the various counties of the State have charge of county roads, and in some case appoint foremen directly under their charge to handle the work.

Convict Labor.—The rock crushing plant at the State prison at Folsom is operated by convict labor.

Present Status of State Highway Work.—At the present time the California highway commission is busily engaged in making surveys or plans of the routes which it expects to construct as State highways. Much of the work will follow existing roads, after the rights-of way have been straightened, but in the mountainous parts of the State, many of the roads will have to be re-located and in some instances, roads will be constructed where none have existed previously. The State has been divided into seven divisions, each under the immediate charge of a division engineer. Arrangements have been made in each division for four survey parties, nearly all of which have been organized and are at work. It is probable that no standard types of construction will be adopted for use throughout the State. The roads will be constructed to suit the traffic needs and the types to be built will vary from well graded dirt roads to the highest type of asphalt macadam.⁴

COLORADO

Section 15, Constitution.—Special or local legislation, for laying out, opening, altering or working or vacating roads, regulating county or township affairs, or chartering toll bridges is forbidden.

Section 16, County Indebtedness for Roads.—Indebtedness contracted in any one year shall not exceed the rates upon taxable property as follows: Counties having assessed valuation of taxable property exceeding \$5,000,000; \$1.50 on each \$1000 thereof; valuation of less than \$5,000,000, \$3 on each \$1000 thereof, and the aggregate indebtedness of any county for all purposes exclusive of debts contracted before the adoption of the constitution, shall not at any time exceed twice the amount herein limited unless authorized at a general election by the qualified electors of the county. Bonds shall not run less than ten years.

State Highway Officials.—The State highway commission consists of three members appointed by the governor and holding office two, four, and six years respectively, one vacancy occurring every two years. The commission selects its chairman who

⁴ Digest prepared by A. B. Fletcher, State highway engineer, March 12, 1912.

receives a salary of \$1200 per annum while the two other members receive \$600 each per annum. The members of the commission are not required to give their entire time to the work. They have office at the State capital and are required to meet not less than once a month. They shall appoint a secretary who shall be a civil engineer and practical road builder and he shall receive a salary not to exceed \$2500 per annum and hold office at the pleasure of the commission. The commissioners and all employees are paid expenses when on official duty. The attorney general of the State is ex-officio attorney to the commission.

Duties of State Highway Officials.—Commission shall by January 1, 1912, complete map showing public roads in each county and, in color, all roads or proposed roads of sufficient importance to entitle them to State aid, and which will form a connected system of roads throughout the State, to be known as State roads. The commission may designate the most important roads as primary and these shall be the first to be improved. Commission must ascertain location and availability of road material throughout the State, methods of construction best adapted to each section, and prepare rules and regulations for construction and maintenance of State roads. Duplicate of maps prepared by county commissioners, showing all public roads must be filed with commission, and upon failure of county commissioners to do this, commission must prepare same and deduct cost from first appropriation to such county. The commission shall apportion State aid fund among counties on or before first Tuesday in March of each year considering area, amount of money expended in road construction, difficulty and expense of such construction, and extraordinary expenses connected with development of new territory, but no part of appropriation shall be expended within corporate limits of cities or towns, nor in any county in which commissioner shall not within ninety days after apportionment have provided for raising by taxation an amount equal to twice the amount apportioned. Amounts apportioned and not called for are distributed to other counties.

State highway commission passes upon plans, specifications, estimates, etc., made by county commissioners for state roads and has authority to approve, alter or disapprove as they see fit. Commission must also pass upon and approve contracts for State road before award by county commissioner. All construction and maintenance of State roads by county commissioners subject to supervision and approval by State highway commission. A detailed report with recommendation shall on first of December preceding each session of legislature be made to the governor by the commission.

Duties of County Officials in Relation to State Aid.—County commissioners prepare a map showing all public roads in the county

and designate on the map such as they consider of sufficient importance to justify their improvement as State aid roads, and file duplicate with State highway commission with statements showing location, character and extent of all road materials in county. They shall make necessary surveys, establish grades, prepare plans, specifications and estimates for all work on State roads and shall report same to State highway commission for approval. Work shall be done according to plans, specifications and estimates as finally adopted by commission. All contracts shall be let by county commissioner, after approval by State highway commission. Fourteen days notice shall be given if estimate exceeds \$1000 and contract must be let to lowest bidders, but all bids may be rejected. Contractor must give bond to State equal to half of contract price. Partial payments may be made but at least 10 per cent shall be withheld until completion and acceptance.

All construction and maintenance shall be under county commissioners subject to supervision and approval of State highway commission. County commissioners may employ for this work a competent civil engineer and road builder who shall receive not more than \$7 per day.

County commissioners shall make before November 30 of each year two detailed reports to State highway commission showing all moneys expended by county on roads during current year, one for State roads and one for all other roads, and these shall contain recommendation as to roads which shall be improved the following year.

State Aid Fund and Apportionment.—All moneys accruing from forest reservations in State under act of Congress approved May 23, 1908, shall be apportioned by the State treasurer among counties in which such reservations are situated in proportion to area of forest reservations in county, apportionment to be made at the beginning of fiscal year and each six months thereafter. Board of county commissioners shall direct that not less than 5 per cent of such fund shall be expended for either road or schools in discretion of board.

An appropriation of \$50,000 was made from the general funds of the State for the fiscal year beginning 1910 for State aid. An appropriation of \$6000 was made for salaries and expenses of commissioners until the above appropriation became available. The manner of apportioning State aid is explained under "Duties of State Highway Officials."

State appropriates specific sums for entire cost of roads and bridges from time to time, these appropriations being special, but aggregating a considerable amount. Such work has been done under State engineers.

Convict Labor.—At the written request of the county commis-

sioners the warden of the State penitentiary shall detail such a number of convicts as he shall deem proper to work upon public roads and highways of such county provided that the county shall pay all additional expenses of guarding the convicts while working upon the public roads within the county and shall furnish all tools and materials for their work.

The board of commissioners of the State penitentiary and the warden are required to employ such a number of prisoners as they may deem practicable upon the construction of certain specified State roads including the Sante Fe Trail. The convicts are granted additional "good time" allowances in the case of short term men and better food for prisoners serving life sentence conditioned upon their good behavior and efficient work. The said board has supervision over the convicts and may appoint competent superintendents.

Toll Roads.—Toll road companies may be incorporated and the county commissioners are authorized to prescribe the rates of toll to be charged.

Indebtedness for Road Improvement.—The county commissioners may when they deem it necessary, enter an order specifying the amount of indebtedness of any county in which the assessed valuation of property shall exceed \$1,000,000 for all purposes not to exceed the following rate: Where the assessed valuation of property exceeds \$5,000,000, \$6 on each \$1000 thereof; where the assessed valuation shall be less than \$5,000,000 and shall exceed \$1,000,000, \$12 on each \$1000 thereof. Bonds shall run not less than ten nor more than twenty years and shall bear interest at a rate not exceeding 10 per cent per annum, payable semi-annually on April 1 and October 1. The commissioners shall levy annually a tax sufficient to discharge the interest on the bonds, and shall levy annually after ten years, from the date of issuance, such fund as shall equal 10 per cent of the amount of the bonds issued in order to provide a sinking fund for the redemption of bonds. The bonds shall not be sold at a discount of more than 15 per cent of their par value and shall only be sold for cash.

Road Districts.—The board of county commissioners may divide the county into suitable road districts and appoint a general road overseer for the county, to hold office for a term of two years, who shall have general supervision over all road work in the county and who shall have authority to appoint deputy road overseers as authorized by the board of county commissioners. Such deputy road overseers shall within their respective districts exercise the powers of the general road overseer but be subject to his orders. The general road overseer shall receive compensation not to exceed \$5 per day for days actually employed and which shall include traveling and personal expenses the total amount paid not to

exceed \$1200 in any one year, to be paid out of the county treasury. Each deputy road overseer shall receive not to exceed \$3 for each days service, to be paid out of the general road fund.

The county commissioners may determine the amount to be expended in each district but it shall not be less than 50 per cent of the road tax collected therein.

Tax Levy for Road Purposes.—The county commissioners may levy property tax not to exceed \$1 on each \$100 valuation.

Road Poll Tax.—Every able bodied man between the ages of twenty-one and forty-five years shall pay to the road overseer a tax of \$2 or perform two day work or one days work with team on the public roads under the direction of the overseer. The road overseer receives a commission of 10 per cent on such taxes collected by him and turned over to the county treasurer.

Corporate Road Districts.—A majority of the qualified electors of any county may petition the board of county commissioners for the organization of the county into corporate road districts. If after a year the county commissioners determine to comply with the petition they shall divide the county into districts and name a board of directors for each district and shall appoint for the county a superintendent of roads and bridges and shall abolish the services of the road overseer. The said superintendent shall receive such compensation as the commissioners may determine, not to exceed \$5 per diem. The board of directors of each district shall consist of three members, who shall have complete authority over the roads and bridges of their district. The county commissioners in any county organized under this act shall levy a special property tax for road purposes not to exceed 50 cents on each \$100 as requested by the directors of the respective districts. Able bodied men between twenty-one and fifty years shall under this act pay to the board of directors a road tax of \$3 or labor two days on the public roads. The directors shall be elected bi-ennially, and shall receive no fees or compensation except \$1 for each meeting actually attended. They shall meet on the first Monday of each month and special meetings may be called at any time by the president thereof.⁵

CONNECTICUT

State Highway Officials.—A State highway commissioner, who shall be a capable and experienced road builder, shall be appointed by the governor, with the advice and consent of the senate, and shall hold office for four years and shall receive an annual salary of \$5000 and actual traveling expenses not to exceed \$1000 in any one year

⁵ Digest revised and approved by J. E. Maloney, secretary and engineer, State highway commission, January 4, 1912.

and office expenses not to exceed \$17,500 in any one year, and shall have office at the State capitol.

Duties of State Highway Commissioner.—He shall keep a record of all proceedings and orders pertaining to the matters under his direction and copies of all plans and specifications and estimates, submitted to him, and shall prepare and submit to the general assembly a biennial report of his doings. He shall have a right to enter any town in the State and lay out and improve any of the trunk lines, and shall certify the cost of such improvement to the State comptroller for payment. He shall keep all State roads in proper repair and shall certify the cost of same to the comptroller. The highway commissioner shall appoint a deputy commissioner, eight division engineers, and such other engineers, deputies, and inspectors as he may deem necessary and shall fix their salaries not to exceed in the aggregate \$75,000 in any one year. He shall divide the State into eight highway districts each under the supervision of a division engineer. The highway commissioner may use the stone crushers owned by the State in any town in which a highway is to be improved under the provisions of the State aid law, provided the aggregate expenses of operating the crushers shall not exceed \$5000 in any one year. The highway commissioner has authority to approve the application of the selectmen of any town for State aid and he shall select the highway to be improved, and make all surveys, plans and specifications therefor; determine the character and have supervision of such work of construction. He may at his discretion permit the towns to make improvements without competition where the cost is \$1000 or less. Where the cost exceeds \$1000 he shall advertise for bids, which must be accompanied by a bond of not less than one-third of the estimated cost of construction. He shall notify the selectmen of the time of opening the bids and he shall have the right to reject any and all bids; otherwise he shall award the contract to the lowest responsible bidder who shall furnish bond for one-third of the cost of construction. Copy of the contract shall be filed with the highway commissioner.

Duties of Local Officials.—When ever any town shall declare its intention to improve a public road under the provision of the State aid act the selectmen thereof shall make written application to the highway commissioner, which application is subject to his approval. Improvements costing \$1000 or less as above stated may be made by towns without competition at the discretion of the highway commissioner. The selectmen may be present at the opening of bids by the highway commissioner. The selectmen shall also be parties to the contract after award by the highway commissioner and they may also submit, in common with other bidders and shall be subject to the same requirements. Any town

having within its limits any road forming part of the trunk line systems as shown by the map of trunk line roads accompanying the report of the highway commission for the years 1907 and 1908 may by improving it to comply with the specifications laid down by the highway commissioner offer it to the state as a part of the trunk line system to be maintained in the same manner as other portions of the trunk line system.

State Aid Funds and Their Distribution.—In towns having taxable valuation of over \$1,250,000 the State pays three-fourths of the cost of roads constructed under the provisions of the State aid act, and in towns having a taxable valuation of \$1,250,000 or less, the State pays seven-eighths of the cost of such construction, the basis of award being the grand list made by the town in which the highway is to be constructed, as revised by the board of equalization, the whole amount to be paid by the State in any one year \$500,000. Any town with the consent of the State highway commissioner may use the full amount of the appropriation to such town for the current and next ensuing year and the appropriation shall be paid by the State as though the work had been done in two years, under separate appropriations. The sum so expended shall not exceed \$10,000 per town in any one year. The trunk line system as exemplified in the report of the highway commissioner of 1907 and 1908 is to be constructed and maintained at the cost of the State, provided that the total amount so expended for construction shall not exceed \$2,000,000 before September 30, 1913.

Care and Maintenance.—The maintenance of all roads constructed under the State aid act shall be paid for by the State. The expense of such repairs on the trunk line systems shall be paid wholly by the State, but the expense of repairs on State roads other than those exemplified on the trunk line systems shall be borne by the State and town in the ratio of three-fourths and one-fourth respectively. The appropriation for care and maintenance is \$100,000 a year, plus all moneys received by the State from the licensing of automobiles, fines, etc., which will amount to about \$300,000 for the two years.

State Bond Issue.—An act approved September 19, 1911, provides for the issuing of bonds to the amount of \$3,000,000 for the improvement of public roads, same to be expended during the two years ending September 30, 1913.

Powers of Highway Commissioner Relating to Trunk Lines.—The highway commissioner shall have the power to lay out, alter, widen, and grade any highway within the State whenever, in his judgment, the interests of the State require such action in connecting with the trunk line systems of highways. He shall give reasonable notice to those who will be affected by the new layout

and shall cause a survey to be made showing such highway, with a description of each parcel of land taken from or annexed to the lands of adjoining proprietors. A hearing shall be given to parties interested and benefits and damages shall be awarded in conformity with the general statutes. The highway commissioner also shall have the same powers as the selectmen of the various towns so far as trunk line systems of highways are concerned. Under this new law, as above, no person or corporation except a municipal corporation, through its proper office has the right to excavate or open the ground in any highway which is a part of the trunk line system unless a permit therefor be first obtained from the highway commissioner.

Local Road Legislation.—Jurisdiction over the roads vests in the selectmen of the towns; but the county commissioners may intervene, when petitioned in writing so to do, if the town or selectmen refuse or neglect to repair the roads therein, and said board of county commissioners may order said repairs to be made.

Taxes are not assessed in labor.

Property taxes shall not be worked out.

The towns may levy sufficient highway taxes to build and repair the highways and bridges therein.

There is no poll tax assessed for road purposes.⁶

DELAWARE

New Castle County

State Highway Officials and Their Duties.—The governor shall appoint, with the consent of the senate, a resident of Newcastle County as the Newcastle County State highway commissioner, who shall serve for a term of four years, and receive a salary of \$1000 per annum. He shall give bond in the sum of \$2000. The levy court of Newcastle county shall provide him with suitable offices in the city of Wilmington, in which the records of his office shall be kept.

He may employ, subject to approval by the levy court, necessary clerical and other assistance. He shall investigate methods of construction and maintenance, and prepare maps and plans showing roads upon which he recommends improvement. Separate specifications shall be made for macadam, Telford, gravel, oyster shell, or any other good firm material which will at all seasons be smooth and convenient for travel. The permanent highways improved under this act, shall not be less than nine or more than sixteen feet between shoulders, and the minimum width of right of ways shall be 33 feet, except in the case of roads already existing.

⁶ Digest revised and approved by Hon. Jas. H. MacDonald, State highway commissioner, January 20, 1912.

The State highway commissioner shall keep a record of all proceedings, orders, petitions, specifications, accounts of money expended by State, county or property owners, and shall prepare a bi-ennial report, with recommendations, to be submitted to the general assembly, during the first ten days of the biennial session.

The State highway commissioner shall have surveys, plans and estimates for the improvement of any highway selected by the levy court, prepared, and submit the same to said court. In no case shall State aid be granted unless approved by the State commissioner.

The State highway commissioner shall advertise for bids for the construction or improvement of State aid roads, such bids to be accompanied by a certified check for such sum as the commissioner and levy court may determine. Bids shall be publicly read at a meeting of the levy court, and shall be referred to the commissioner and levy court for final approval. Either the commissioner or the levy court may reject any or all bids for cause, otherwise the levy court shall award the contract to the lowest responsible bidder, who shall give bond in the sum of one-third the contract price. The said commissioner shall certify the amounts to be paid the contractor, as the work advances, but not to exceed 80 per cent of the full value of the work done prior to such time shall be paid. Five per cent of the contract price shall be withheld for one year after the completion and acceptance of the work and all contracts entered into, under the provisions of this act, shall provide for the maintenance of such highway, for a period of one year, at the expense of the contractor.

The said highway commissioner shall have entire charge of all work done under such contract and his decision shall be final. As soon as practicable he shall appoint a supervisor of construction of the work under contract, who shall receive three dollars per diem, to be paid by the levy court. Said commissioner may at any time discharge such supervisor for incompetency or neglect of duty.

County Officials and Their Duties.—The levy court of Newcastle County has authority to approve recommendations made by the Newcastle County State highway commissioner. The levy court has authority, in the first instance, to select roads to be improved by State aid, but such selection is subject to approval by the said State highway commissioner. All bids must be publicly read at a meeting of the levy court, and must be referred to it for final approval. Contracts under the provisions of this act, shall, on behalf of the levy court, be executed by its president. The levy court has power to appropriate such monies as may be necessary, from time to time, for carrying on the work. The duty of keeping roads, constructed under the provisions of this act, in repair, shall

devolve on the levy court, and it may be the duty of said court to appoint a county supervisor to hold office for a term of four years, and to determine his salary or allowance.

It shall be the duty of the county supervisor to report to the levy court all repairs deemed necessary on such roads, and under the direction of said court, to spend the money raised for such repairs.

By the act of 1907, the levy court of Newcastle County is required to appoint a competent and skilled road engineer, to be paid a salary of \$2500 per year, to hold office for the term of four years, unless sooner removed for cause, and the act also provided that it would be no objection to said county road engineer if he should also hold the office of Newcastle County State highway commissioner, provided, that if one person should fill both offices, the salary paid to him by the said levy court, should only be \$1500 per annum.

It shall be the duty of the authorities of any city, within which a portion of any highway may be constructed, under the provisions of this Act, to keep such portion in repair forever, after such construction.

Abutting Property Owners.—The property owners along any highway in the county, not improved under the provision of this act, may assume the whole expense of the improvement of such highway, and prepare a plan, including the levels and distances, and all specifications, and submit a copy of such plans, specifications, etc., to the State highway commissioner, to be by him submitted to the levy court of Newcastle County, as in the case of other plans and specifications. If the said commissioner and levy court approve, the owner or owners may accept bids and make contracts for the construction of such road, and shall have control of the expenditure of the money so used, subject to the approval and supervision of the county supervisor. Upon the completion of such road to the satisfaction of the said supervisor, and the said commissioner and levy court, and the full payment therefor, such highway shall thereafter be a county highway the same as other highways improved under the provisions of this act.

Road Revenues and Their Distribution.—One-half of the cost of highways constructed under the provisions of this act, shall be paid by the State, provided, that the amount expended shall not in any year exceed the sum appropriated by the general assembly. The appropriation at present, is \$10,000 annually. The levy court shall provide all necessary funds to keep such roads in repair, except in the limits of incorporated cities, and if there be no money on hand for such purposes, they may borrow therefor, on temporary loans, until the next annual taxes shall have been collected. The authorities of incorporated cities are required to keep State aid roads, within their boundaries in repair.

The levy court of Newcastle County was also in 1911 authorized to issue bonds for road improvement for the sum of \$200,000 under same conditions as those of 1909.

The levy court of Newcastle County was authorized in 1909, to borrow a sum not exceeding \$300,000, to be expended for the permanent highways of Newcastle County, bonds to bear interest at a rate not to exceed $4\frac{1}{2}$ per cent, payable semi-annually. The proceeds of the bond issue to be pro-rated among the various hundreds of the county, and the specific road upon which such apportionment should be expended, being set forth in the act authorizing the bond issue, all work to be done under the provisions of the act creating the office of Newcastle State Highway Commissioners.

Kent County

State Highway Officials, and Their Duties.—The governor, with the consent of the senate, shall appoint a resident of the county as Kent County State highway commissioner, to hold office for a term of four years, and receive a salary of \$1000 per annum. He shall give bond in the sum of \$2000, and shall be provided, by the levy court, with suitable offices in the city of Dover. His duties are identical with those of the Newcastle County commissioner.

Road Revenues and Their Distribution.—The State pays one-half the cost of all roads improved under the provisions of this act, in the same manner as in Newcastle County. The State highway commissioner is required to appoint a supervisor of construction the same as for Newcastle County. The various provisions of the laws relating to Kent County follow the same lines as those for Newcastle County.

The levy court is authorized to issue \$100,000 of 4 per cent bonds for the permanent improvement of highways, the proceeds to be apportioned among the several districts of the county, as nearly as practicable.

Sussex County

No State highway commissioner is provided for Sussex County, and the State contributes nothing in the way of aid for road improvement, except that \$10,000 is appropriated annually for that purpose, without any provision for State supervision or any requirement as to how the money should be expended. An act was passed in 1909, providing for the appointment of a county road engineer, to be placed in charge of the road work, subject to the direction of the levy court.⁷

⁷ Digest revised and approved by Mr. Francis A. Price, State highway commissioner, December 26, 1911.

FLORIDA

Constitutional.—The legislature shall have power to issue State bonds only for the purpose of repelling invasion, or suppressing insurrection or for redeeming or refunding bonds, already issued at a lower rate of interest (Con. 1887, art. 9, sec. 6).

Statutory.—The county commissioners are invested with the general supervision of the public roads in their respective counties and may establish new roads, change and discontinue old ones and keep the same in good repair (Gen. Statutes, 1906, div. 1, tit. 9, ch. 7, sec. 835).

Each county shall constitute a road unit and all divisions of the county for road purposes shall be designated as road districts. Each county commissioner district shall constitute a road district.

The county commissioners are required, at their January meeting each year, to appoint three persons, in each road district, as commissioners of roads and bridges, who are required to lay off the roads in their respective districts into convenient subdivisions, apportion the hands liable to work thereon and appoint an overseer for each road subdivision (Gen. Statutes, 1906, div. 1, tit. 9, ch. 7, sec. 840-43, ch. 11, sec. 872).

Taxation.—In counties, not operating under special law, the rate of tax levy which may be assessed for road purposes is increased from 3 to 5 mills on each dollar of assessed valuation, one-half of the amount so assessed against property in incorporated cities and towns shall be paid over to such city or town for use in construction and repair of streets therein (Acts 1907, ch. 5677).

All able-bodied male residents, between the ages of eighteen and forty-five, residing in any county in the State for thirty days, unless exempt by law, are subject to work on the roads and bridges for not more than five days each year in person, or by able-bodied substitute, or in lieu thereof to pay \$1 for each day that he is required to so work (Acts 1907, ch. 5677).

All lands granted to the State by the United States, under act of Congress, 1850, known as the "Swamp and Overflow Act," for internal improvements, shall be sold by the trustees of the internal improvement funds, and the proceeds placed to the credit of the county road fund, to be used by the county commissioners for the construction of macadamized or other hard surfaced roads (L. 1903, ch. 5245, Gen. Statutes, 1906, div. 1, tit. 9, ch. 10, sec. 869-71).

The board of commissioners of every county, at a meeting for correcting and reviewing the county assessment, shall determine the amount of money to be raised by tax for county purposes, . . . and may levy a tax of not to exceed 8 mills on the dollar of real and personal property in the county for the purpose of

constructing, working, repairing or maintaining roads in the county, hard surface or otherwise (L. 1911, ch. 6157).

Width of Tires.—The width of tires on vehicles used to haul heavy loads over improved roads in any county in the State shall be as follows: for a two-horse wagon, cart or vehicles 4 inches wide; for a four horse wagon, cart or vehicle 6 inches wide and for a four horse wagon, cart or vehicle, used to haul heavy logs or stone, not less than 7 inches. Subject to adoption by the county commissioners (Act 1905, ch. 5450).

Convict Labor.—Municipal convicts may be worked upon the streets or public works of such municipality and county convicts may be worked upon the roads in the county. Convicts may be transferred from one county to another upon agreement between the county commissioners of the counties in interest (Gen. Statutes, 1906, div. 5, tit. 4, ch. 2, art. 1, sec. 4110-14).

Special Road and Bridge Districts.—Upon petition signed by not less than 25 per cent of the registered voters, who are free-holders, residing within any territory, embraced wholly or in part in one or more road districts, petitioning that said territory shall constitute a special road and bridge district for the purpose of improving roads and bridges therein, by the levy and collection of a special road and bridge tax, or by the issue and sale of bonds, the board of county commissioners shall order an election to be held within such territory to determine whether or not such territory shall be constituted into a special road and bridge district for the purpose named. A favorable majority vote is required.

In case said special road and bridge district is constituted, the board of county commissioners shall have prepared plans and specifications for the roads and bridges to be improved and shall let same to contract, after due advertisement for bids for same, and shall supervise the construction work.

If, at said election, it shall be determined that bonds shall be issued to pay for such improvements, then the board of county commissioners shall issue and sell said bonds and shall annually levy a tax on the property within said district to pay the interest and create a sinking fund for their redemption. But, if at said election, it shall be determined to pay for said improvements by special tax, then said board of county commissioners shall annually assess and collect a special road and bridge tax, not exceeding 20 mills on the dollar in any one year, in addition to the county road tax, for the purpose of paying for said improvements. They may also levy a tax to keep the roads in repair after they shall have been improved. Such special road and bridge districts are entitled to receive their due proportion of the county tax levied for general road purposes (L. 1911, ch. 6208).

Automobile Licenses.—The owner or operator of every auto-

mobile, or other motor vehicle, operating in the State more than fifteen days, when used for hire or when charge is made for use in any manner or form whatsoever, shall pay to the tax collector of the several counties in which the same may be a county license tax, as follows: less than 10-horse power \$5; 11 to 29 horse power \$10; 30 to 40-horse power \$20; 41 to 50-horse power \$30; 51 to 60-horse power \$50; 61 to 70-horse power \$70; 71 horse power and over \$100. When such automobile or motor vehicle is used by the owner thereof without charge, its annual license shall be as follows: 10-horse power \$3; 11 to 29-horse power \$5; 30 to 40-horse power \$10; 41 to 50-horse power \$15; 51 to 60-horse power \$25; 61 to 70-horse power \$35; 71-horse power and over \$50. The payment of one such county license tax in the State exempts further liability in other counties of the State. All moneys derived from the payment of such license tax shall be paid into the road and bridge funds of the several counties (L. 1911, ch. 6212).

Congress is memorialized to make liberal appropriation for the building of a system of good roads and highways throughout the different States of the Union and the senators and representatives of Florida, in Congress, are requested to do all in their power to secure the enactment of the laws for that purpose (House Rules and Resolutions, no. 22, 1911).⁸

GEORGIA

Convict Labor.—Sec. 1, volume 3, of the Code of 1895, is amended to read as follows: Every crime declared to be a misdemeanor is punishable by a fine not to exceed \$1000, imprisonment not to exceed six months, to work in the chain-gang on the public roads, or on such other public works as the county or State authorities may employ the chain-gang, not to exceed twelve months, any one or more of these punishments in the discretion of the judge.

Sec. 2. All male felony convicts, except such as are now required by law to be kept at the State farm, may be employed by the authority of the several counties and municipalities upon the public roads, bridges or other public works thereof. On or before the tenth day of February annually, the prison commission shall communicate with the county authorities of the State and ascertain those counties desiring to use convict labor upon their public roads, and said county authorities shall advise the prison commission, in writing, whether they desire to so use such labor and the number desired. The convicts shall be apportioned among the counties according to population. Should any county desire

⁸ Digest examined and approved by Hon. Park Trammell, attorney-general of Florida, February 10, 1912.

to work more than its proportion of convicts upon its roads, requisition shall be made therefor and the prison commission shall furnish the number so required. Convicts may be awarded to counties other than the one in which the conviction was had. One county may, upon the approval of the prison commission, deliver its quota of convicts to another county, to be used on the roads and bridges thereof, the counties so receiving such convicts to have the right to compensate the county from which the convicts come, with work upon its roads, or by the exchange of an equal number of convicts.

Sec. 3-6. The prison commission is authorized, when in funds, to purchase road machinery, appliances and teams, and to equip and organize road-working forces, the same to be used for the construction and repair of roads and bridges in the counties not using their convicts under the preceding sections, when requested by the authorities thereof so to do, the work to be done as nearly as practicable in proportion to the convicts which would have been assigned to each county in case the county had worked its convicts, but as many convicts in addition to said proportion may be worked as any county is willing to pay the expense of, and as the commission may have at its disposal. The county in which convicts are worked shall pay the expenses thereof, including maintenance of equipment and all material required for the work done in the county. If all convicts are not disposed of under the preceding provisions, the prison commission is hereby authorized to place convicts in counties desiring to use them in excess of their quota. If after the counties have been provided with convicts there shall still remain any convicts not otherwise disposed of, then the privileges conferred upon counties herein shall be extended to municipalities, which may hire convicts from the prison commission at the price of \$100 per capita per annum.

Sec. 9. Any county may purchase, rent and maintain a farm and cultivate same with convict labor in connection with working its convicts on its public roads and bridges, all products and supplies arising from said farm to be used for the support of the convicts, improvement of its public roads and bridges, and in support of county institutions.

Sec. 13. All convicts and all convict camps shall be under the direct supervision of the prison commission, which shall prescribe rules and regulations for governing same, subject to approval by the governor, and shall have authority to discharge any employee having either care or charge of said convicts, or said convict camps, and said prison commission shall require the observance and maintenance of sanitary rules and appliances.

Sec. 16-19. The net proceeds from the disposition of convicts to municipalities or otherwise shall be used by the prison com-

mission in working convicts upon the public roads or works of counties not electing to utilize their allotment of convicts, at the option of said commission; and in case said commission shall elect to not work the roads in any one or more of said counties, then the pro rata of said funds for said counties shall be paid into their respective treasuries to be used for road purposes only. The prison commission may purchase or lease for five years one or more tracts of land conveniently located for working the convicts thereon and the State farm shall be used as far as possible for making supplies of all kinds for maintaining the convicts, either in farm products, or manufacturing articles for the use of the convicts and the State sanitarium, and other State institutions. If the prison commission has on hand convicts not provided for under the foregoing sections of this act, they may be placed upon said farms to work. The prison commission shall employ such superintendents as may be necessary in connection with working said farms and pay them not to exceed \$1200 per annum and actual traveling expenses while officially engaged, together with a residence for himself and family, on said farm.

Sec. 20. Not to exceed four supervisors may be employed by said prison commission, if same shall be deemed necessary, who shall visit the various counties, inspect the convicts and their work, and perform such other duties as may be required of them. If practicable, civil engineers shall be selected for these positions, and the salaries shall not exceed \$150 per month and actual traveling expenses. The commission shall also appoint such wardens and guards as may be necessary, and the pay of a guard shall not exceed \$50, and that of a warden \$100 per month.

The legislature meets annually on the fourth Wednesday in June.

Local Road Legislation.—The board of county commissioners or the ordinary of each county has jurisdiction of the roads therein, and shall divide the county into road districts and appoint three road commissioners for each district, who in turn appoint road overseers.

All able-bodied males, not exempt by law, shall be liable to four days' labor on the public roads or to commute for same by paying \$3 in cash to the overseer.

The commissioners of roads and revenues or the ordinary may levy a tax of not more than 20 cents on each \$100 of taxable property for roads.

There is no general law authorizing issuance of road bonds, so that the legislature in each case must authorize a bond issue by special enactment submitting it to the people.

IDAHO

Extract from letter of Mr. A. E. Robinson, State engineer, January 3, 1912.

Replying to yours of December 20, I am pleased to return to you the enclosed general statement of the Idaho laws. While this law appears on our statute book, it has not been followed for several years, and the legislature has not made appropriations for this purpose, but in appropriating money for highways, has provided for the appointment of a separate commission for each piece of the work. Generally the State engineer is made a member of these commissions.

State Highway Officials.—The State highway commission is composed of the governor, State engineer, and State mining inspector. The said commission has control and supervision over all roads bridges and trails constructed in whole or in part at the expense of the State, in order that the same may be kept in proper repair. The governor is ex-officio chairman and the commission at its first meeting elects one of its members secretary. The State treasurer is treasurer of the commission. The members shall serve without pay but are allowed actual and necessary expenses. They shall make an itemized report to the State auditor on the first day of June and January of each year.

When any road or trail is in serious need of repair the commission shall have the same inspected and the inspector shall make the report to the commission in writing. The commission shall then by registered letter notify the board of county commissioners of the place where such repairs are needed and the nature of the work necessary to put the said road or trail in proper condition. If the board of county commissioners fail to make said repairs by given time the said commission is authorized to lease the said road to some company or individual and permit the collection of tolls as specified in the lease, for a period not to exceed five years.

State Highway Funds.—The legislature makes its appropriations from time to time for the improvement or construction of specific roads or bridges designated in the appropriation act.

Local Road Legislation.—Jurisdiction over roads vests in the board of county commissioners, who shall divide the county into suitable road districts. A road overseer is elected annually for each road district by the electors thereof.

Every able-bodied male, between twenty-one and fifty years of age, shall perform two days labor on the public roads, or commute for same by paying \$4 in cash.

The board of county commissioners shall annually levy a road tax of not less than 10 nor more than 60 cents on each \$100 of taxable property therein. The said board may also levy a special road tax of not to exceed 10 mills on each \$1 of taxable property, which may be paid either in cash or labor.

County bonds may be issued on a favorable vote of two-thirds of the qualified electors of the county. Such indebtedness shall not run to exceed twenty years.

Provision of law is made whereby special good road districts may be formed and on favorable vote of two-thirds of the electors thereof bonds may be issued to an amount not exceeding 25 per cent of the assessed value of real property within such district.

ILLINOIS

State Highway Commission.—In 1909 there was appropriated for the State highway commission, for experimental work, preparation of road and bridge plans and estimates, collection of highway statistics, and all other expenses that may be necessary for the work of the said commission, the sum of \$65,000 per annum (L. 1909, H. B. no. 730).

The governor shall appoint, by and with the advice of the senate, three persons to be known as a highway commission, two of whom shall belong to the political party casting the highest number of votes at State election, all of whom shall hold office for two years unless sooner removed for cause, and before entering upon their duties shall take the oath prescribed for other State officers. The governor shall designate one of said commissioners to act as chairman for a term of two years. Said commission shall be provided with suitable offices in the State capitol, and with the necessary appliances and supplies. Said commission shall report annually to the governor.

Said commission shall investigate the best methods of road construction and repair, and determine upon the methods best adapted to the various sections and soils of the State. It may be consulted by county, city, village, or township officers having authority over roads and highways.

The members of said commission shall serve without pay, but shall receive their actual expenses while officially engaged. Said commission shall have power to appoint a State engineer, who shall receive reasonable compensation for his service, and shall receive his actual traveling expenses while officially engaged. Necessary clerical assistants may also be employed (L. 1909, p. 74).

Convict Labor.—Convicts may be used to manufacture road building material, such as tile, culvert pipe, and road building and ballasting material, said material to be furnished free; and in the manufacture of road machinery, tools and necessary appliances. The authorities of the counties may make application to the State highway commissioner for these things, obligating themselves to use the same according to regulations formulated by him.

By act of 1905, page 345, said convicts may be required to crush rock for road improvement; said crushed rock or other manufactured road material shall be furnished free at such penitentiary or reformatory institutions, upon the requisition of the State highway commission, upon the express agreement that such material shall be placed in a permanent public highway (Acts of 1905, p. 344, as amended L. 1907, p. 442).

Local Road Legislation.—In counties under township organization the township commissioners of highways, three for each township, have charge of the roads and bridges in the respective towns and may employ a general superintendent, appoint overseers, employ laborers or let the work to contract.

In counties not under township organization the county boards of commissioners divide each county into road districts. In each such road district three commissioners of highways and one district clerk are elected and the said commissioners of highways may appoint a general superintendent of roads, overseers, employ laborers or let the work to contract.

In counties under township organization the township commissioners of highways shall levy a road tax not to exceed 36 cents on each \$100 of real, personal, and railroad property in the town; and, in case of emergency, they may, upon written consent of a majority of the board of town auditors, levy an additional tax of not to exceed 25 cents on each \$100 of taxable valuation.

For road damages they may levy an additional 20 cents. The above applies if township is under cash system.

If under labor system a levy of 25 cents is made to be worked out. An additional 25 cents may be levied under the emergency clause and a further levy of 25 cents may be made for purchase of tools, machinery, materials and bridges.

Every able-bodied male between twenty-one and fifty years of age, outside incorporated cities and towns, shall pay a poll tax of not to exceed \$2 each year, all of which above taxes shall be paid in money.

In counties not under township organization, the commissioners of highways of the districts therein may annually levy a road and bridge tax of not to exceed 30 cents on each \$100 of taxable valuation. And for road damages an additional tax of 12 cents on the \$100.

In addition, every able-bodied male between twenty-one and fifty years of age, not exempt by law, outside incorporated cities and towns, may be required to work on the roads not more than three days each year, or commute for same at the rate of \$1 per day.

Townships and districts, upon favorable vote of a majority of the legal voters thereof, may borrow \$35,000 for the purpose of

building gravel, macadam or other hard roads, and may issue ten-year 5 per cent bonds for such indebtedness. In addition may vote a five-year tax not to exceed \$1 on the \$100 for construction of hard roads.⁹

INDIANA

Constitutional.—No law shall authorize any debt to be contracted on behalf of the State, except to meet casual deficits; to pay the interest on the debt; and to repel invasion or suppress insurrection (Con. 1816, art. 10, sec. 197).

No political or municipal corporation in this State shall ever become indebted in any manner or for any purpose to an amount in the aggregate exceeding 2 per centum on the value of the taxable property within such corporation, provided that in time of war, foreign invasion or great public calamity larger indebtedness may be created upon petition of a majority of the property owners (Con. 1861, art. 13, sec. 220).

Statutory.—By virtue of their office, the commissioners of each county are constituted a board of directors for all free gravel, macadam and turnpike roads in such county. They may divide the free turnpikes in each district and appoint a superintendent for not less than 10 nor more than 15 miles of free gravel road therein. (Burn's *Annotated Statutes*, 1908, vol. 3, ch. 82, art. 9, sec. 7754-57).

Generally the control of highways vests in the county commissioners and the township trustees. Each township is divided into districts and the qualified voters in each such district, every two years, elect a supervisor of roads, at a compensation of \$2 per day for not exceeding 60 days in any one year. (Burn's *Annotated Statutes*, 1908, vol. 3, ch. 82, art. 10, sec. 7760-63).

Taxation.—The board of county commissioners shall annually levy on all taxable property in the county, not to exceed one cent on the \$100 of valuation, for every 10 miles of free gravel, macadam or turnpike roads completed in such county, the proceeds to be paid into the gravel road fund and used for their repair (L. 1907, ch. 276, sec. 2).

A tax of 30 cents on each \$100 valuation is levied annually by the township trustees on the property within each township, and 10 cents additional may be levied for bridges and culverts with the consent of the township advisory board.

All able-bodied male residents of the district, between twenty-one and fifty years of age, unless exempt by law, are required to work not less than two nor more than four days each year upon the roads. Said labor may be commuted by the payment of \$1.50

⁹ Digest revised and approved by A. N. Johnson, State highway engineer, March 25, 1912.

for each day's work so required, or an able-bodied substitute may be furnished (Burn's *Annotated Statutes*, 1908, vol. 3, ch. 82, art. 10, sec. 7764-80).

Bond Issues.—Road bonds may be issued by the board of county commissioners to an amount not exceeding 2 per cent of the assessed valuation of the county. When bonds are issued a tax sufficient to meet the interest and create a sinking fund on same shall be levied upon the property in the township, within which the proceeds of the said bonds are expended (Burn's *Annotated Statutes*, 1908, vol. 3, ch. 82, art. 6, sec. 7725-26).

Width of Tires.—It was made unlawful for any one to haul over any turnpike, macadam or gravel road when the same is thawing through or is in condition to be cut up, a load of more than 2500 pounds, including driver and vehicle, on a tire of less than 3 inches in width, nor more than 3000 pounds with tires between 3 and 4 inches, nor more than 3500 pounds with tires between 4 and 5 inches, nor more than 3800 pounds with tires over 5 inches. A fine of from \$5 to \$50 is fixed for violation of this provision (Burn's *Annotated Statutes*, 1908, vol. 1, ch. 5, art. 3, sec. 2313).

Convict Labor.—All able-bodied prisoners sentenced to any county jail or work-house may be put to work on the public highways. (Burn's *Annotated Statutes* 1908, vol. 1, ch. 4, art. 20, sec. 2189).

Toll Roads.—The board of county commissioners is authorized, on petition of a majority of the legal voters of any township in which any toll road is located, to proceed to acquire such toll road and may issue bonds to pay for same and levy a tax to meet the interest and create a sinking fund for redemption of such bonds. Such roads, when acquired, shall be free from toll and be kept in repair as free gravel roads (L. 1911, ch. 30).

Free Gravel Roads by Assessment.—The board of county commissioners of every county have the power to lay out construct or improve by graveling or macadamizing any public highway upon the presentation to the board of a petition stating the kind of improvement desired and the points between which the same is asked, signed by a majority of the resident land owners whose lands lie within one mile of the proposed improvement, and such majority shall represent a majority of the acres owned by said residents. The board after it has been satisfied that due notice of application has been given by publication, shall appoint three disinterested free holders of the county as viewers and a competent surveyor or engineer to examine and lay out such highway as in their judgment public utility may require. Viewers shall determine what lands will be benefitted or damaged by the proposed improvement and if they find that the costs and damages caused thereby will be less than the benefits to the lands within two miles of the improvements they shall apportion the estimated costs

and damages upon all the said lands within two miles that will be benefitted, according to the benefits derived therefrom. They shall then make a complete report to the board of commissioners. No lands shall be assessed for benefits that do not lie within two miles of contemplated improvement nor lands within incorporated towns or cities. A time shall be fixed for a hearing of the report at which time the board of commissioners may enter upon its records an order that the improvement be made. Provision is made by the laws for remonstrances by owners of lands affected. If the assessment upon the lands of any remonstrant is not reduced 20 per cent or the damages claimed are not increased 20 per cent, such remonstrant shall pay the costs of such remonstrance. If the assessment is reduced more than 20 per cent and the damages increased more than 20 per cent, he shall recover costs to be prorated upon the lands assessed for benefits.

After the improvement has been ordered and the assessments confirmed, the board of commissioners shall appoint a superintendent who shall execute a bond in double the amount of the assessments, and whose duty it shall be to execute the work authorized. He shall let contract for such construction in whole or in part. As soon as the contract or contracts are let the superintendent shall assess the lands benefitted in accordance with the action of the board of commissioners such sum as may be necessary to pay for the work.

Bonds may be issued to pay for such gravel road construction provided the owners of lands assessed for benefits shall within thirty days from the establishment of the work file their written request therefor with the superintendent of construction. The superintendent of construction shall carefully ascertain the total cost of the work and shall apportion such total cost to the several tracts of land assessed and shall report to the board of commissioners all such sections together with requests for bonds, etc., which the board shall examine and if found correct shall approve. They shall then direct the county auditor to prepare an assessment sheet gravel road duplicate and the auditor shall assess on such land from year to year a sum sufficient to pay the bonds and interest as they mature. As soon as the duplicate is so prepared the board of commissioners shall issue the bonds of the county, said bonds to be payable annually for ten years and to bear interest of six per cent per annum payable semi-annually and shall be payable out of collections made on such assessments.

When the work of improving such highway is completed and the superintendent shall certify the same to the auditor of the county, the board of commissioners shall provide for keeping such roads in repair.

Taxation in Cities or Towns.—When any highway to be improved under the preceding sections begins or terminates in any city or town the corporate authorities may on agreement with the board of commissioners levy a tax for the payment of not exceeding one-fifth of the entire cost of such improvement in addition to any amount that may be assessed in said city or town by virtue of said sections provided the entire tax for road purposes shall not exceed in one year fifty cents on one hundred dollars of taxable values of such city or town.

Into Adjoining County.—When it is desirable to continue such highway improvement into or through an adjoining county the same proceedings shall be had in such county as were had in the county where the improvement begins.

One Mile or Less.—Whenever there shall be constructed in any county a public gravel road not less than one mile in length, except where the entire length is less than one mile, and connecting with any free gravel road or terminating at any city or town, if the said road meets certain requirements as to condition, the board of commissioners upon the written request of not less than three freeholders residing in a road district may after examination designate such road as a part of the free gravel or turnpike roads of such county.

All highways improved under the preceding sections shall be free of toll.

Free Gravel Roads by Taxation.—The county commissioners when petitioned by fifty freeholders shall after publication submit to the voters in the township or townships or city the question of building such road or roads as are petitioned for. If a majority of those voting are in favor of the building of such road or roads the commissioners shall at once proceed to the construction of the same. It shall be the duty of the board of commissioners before the election is held to appoint a surveyor, viewers, to locate the road and make profile of the grade, determine quality of material to be used, make estimates, etc. As soon as the election returns have been made in favor of such road and all claims filed for damages have been settled, it shall be the duty of the commissioners to advertise for bids for building the road and no contract shall be let for a bid higher than the estimates made by the viewers. For the purpose of raising money to pay for such improvement the board of commissioners shall issue bonds of the county in forty equal series first payable in six months and the remainder at equal intervals, bearing interest at not higher than 4 per cent per annum payable semi-annually. For the purpose of paying money to meet said bonds and interest, the commissioners shall levy a special tax upon the property of the township including towns and cities

if such there be, of less than 30,000 inhabitants in which such road is located. All such roads shall be free of toll and shall be kept in repair the same as other free gravel roads. The board of county commissioners is required to appoint a competent superintendent to supervise the construction of such road and his compensation shall not exceed \$2 per day for time actually employed. It shall be unlawful for any board of county commissioners to issue bonds for the construction of free gravel or macadamized roads when the total issue including bonds already issued, is in excess of four per cent of the total assessed taxable valuation of the township.¹⁰

IOWA

State Highway Commission.—That the Iowa State College of Agriculture and Mechanical Arts at Ames, shall act as a highway commission for Iowa, whose duties it shall be:

1. To devise and adopt plans and systems of highway construction and maintenance, suited to the needs of the different counties of the State, and conduct demonstration in such highway construction, at least one each year at some suitable place, for the instruction of county supervisors, township trustees, superintendents, students of the college, and others.

2. To disseminate information and instruction to county supervisors, and other highway officers who make request; answer inquiries and advise such supervisors and officers on questions pertaining to highway improvements, construction and maintenance, and when ever the board of supervisors of a county adjudge that the public necessity requires a public demonstration of improved highway construction or maintenance in said county, and so request and agree to furnish necessary tools, help and motor power for same, the commission shall furnish as soon as practicable thereafter, a trained and competent highway builder for such demonstration, free to the county.

3. To formulate reasonable conditions and regulations for public demonstrations; and to promulgate advisory rules and regulations for the repair and maintenance of highways.

4. To keep a record of all the important operations of the highway commission, and report same to the governor at the close of each fiscal year.

State Highway Funds.—Ten thousand dollars annually for office expenses. All traveling expenses are paid by the counties.

Administration of Roads.—State highway commission has advisory powers only. The principal work has been on culvert and

¹⁰ Digest revised and approved by Mr. C. A. Kenyon, president, Indiana Good Roads Association, March 20, 1912.

bridge improvement for which both standard and special plans are prepared and these are furnished under such conditions as are found necessary. Surveys and inspection of roads are also furnished or approved by the commission. Expenses and usually the salaries of the field engineers and inspectors are paid by the counties.

2. The county board of supervisors, consisting of three to seven men for each county, have control of the bridge funds, a portion of the road funds and the automobile tax or license.

3. The township trustees, consisting of three men for each township have control of the township road fund and the township drag fund.

General Road Funds.—The county bridge fund is levied to build all bridges except the small township culverts. The county road fund is used for road work under county direction.

The township road fund is used for grading and drainage of roads and small culverts under township direction. There is now a special road drag fund which will amount to \$300, more or less per township annually which can be used for road dragging only.

The Basis of Taxation.—The taxable valuation of all property is taken at one fourth of the assessed valuation. The county road fund maximum levy of 5 mills on all property within the county except that included in cities of first class. County road fund, 2 mills on taxable valuation of all property in county outside of incorporated towns and cities. Township road fund, 3 mills. Township road drag fund, 1 mill.¹¹

KANSAS

State Aid.—No State highway department has been provided for by law but the office of State engineer established at the Agricultural College is furnishing advice and plans and specifications for roads and bridges and drainage and irrigation and giving the work general supervision. About \$6000 per annum is allotted for salaries, office supplies and equipment from the State appropriation for the extension service of the college.

Art. 11, sec. 8, of the Constitution of the State of Kansas provides; "That the State shall never be a party in carrying on any works of internal improvements," so that until this section of the constitution is amended no State aid for the construction of roads and bridges can be granted.

Classification of Roads.—All roads of every county in the State shall be classed according to their relative importance as "State

¹¹ Digest revised and approved by Mr. Thos. H. MacDonald, State highway engineer, February 1, 1912.

roads," "county roads," "mail routes," and "township roads." The "State roads" shall be all roads laid out and defined by the State of Kansas. The "county roads" shall be all roads designated as such by the board of county commissioners of a county, who shall, as soon as practicable, name as such county roads direct highways connecting cities and market centers, whether both such cities and centers are within the county, or one is within and the other without such county. Free delivery mail routes shall be known as "mail routes," and all other public highways within a township are "township roads." All county and State roads shall be maintained at the expense of the county, and all mail routes and township roads where they do not coincide with county and State roads at the expense of the township in which they are situated (L. 1911, no. 1008, sec. 18).

Administration.—The units of administration are the counties and township; the board of county commissioners has authority and supervision over State and county roads.

In all counties of the State, if in the judgment of the board of county commissioners, the county surveyor be competent to superintend the county and State roads, such county surveyor may be the county engineer of public highways and bridges; but if the board of county commissioners shall deem the county surveyor incompetent for such work within the State, the board may appoint some person other than the county surveyor county engineer of public highways and bridges.

The county engineer shall have general supervision of all county roads and bridge work in the county, under the authority of the board of county commissioners, and of all mail routes and township roads under the direction of the township trustee and the highway commissioners in the various townships of the county.

If in the performance of his duties, the said county engineer or the board of county commissioners of any county shall desire advice and scientific knowledge of the State engineer of roads and highways at the State Agricultural College at Manhattan, Kansas, they may command such services; and it is hereby made the duty of the State engineer and the State Agricultural College at Manhattan, Kansas, to furnish all such advice and scientific knowledge without charge and expense to the county engineer or to the board of county commissioners requiring the same, or to the county they represent.

The township trustee, clerk and treasurer of each municipal township in the State shall constitute a board of commissioners of highways and township auditing board for their respective townships. All mail routes and township roads shall be under the control of said board of commissioners of highways. The township board shall appoint one or more overseers for all mail routes and

township roads in the township, who shall work the roads for as many days each year as the said highway commissioners and the engineer may direct.

The township trustee shall be the chairman and the township clerk shall be the clerk of the highway commissioners. The highway commissioners shall keep in repair and improve as far as practicable all roads under their direction. They may employ a superintendent, outside of their own body, to execute their orders and superintend contracts entered into by them, and may let contracts and employ laborers, or entrust the same to the control of the county engineer.

The county engineer and highway commissioners shall determine where and when the road work shall be done upon all mail routes and township roads, and the board of county commissioners and the county engineer shall perform the same service in regard to State and county roads.

With the approval of the highway commissioners the township trustee shall determine what mail routes and township roads can be dragged and shall each year arrange with some person or persons to drag the same at such times and upon such terms as may be directed, not exceeding 75 cents per mile for each dragging, nor more than \$10 per mile for any one mile per year for the dragging of such roads. The county engineers, with the approval of the board of county commissioners shall determine what State and county roads can be dragged and shall arrange for the dragging of same at the same rate of cost as prescribed for mail routes and township roads (L. 1911, no. 1008, sec. 19-31 inclusive).

Revenues. Taxes assessed for the purpose of constructing and maintaining public roads and highways shall be paid in cash and collected, as provided for in relation to other taxes (L. 1911, no. 1008, sec. 32).

The county commissioners of each county may levy a road tax for county and State roads and bridges of not more than 1 mill on the dollar on all taxable property in their respective counties and the same shall be collected as are other taxes, and expended upon the building, repairing, maintaining and improving of State and county roads in such county under the direction of the county commissioners, and the approval of the county engineer; provided that upon the majority vote at an election called for the purpose in such county, the said tax levied may be increased not to exceed 3 mills for such road purposes; provided, that the board of county commissioners shall, within the limit prescribed of 1 mill on the dollar, keep all State and county roads within their respective counties in first-class condition (L. 1911, no. 1008, sec. 33).

The highway commissioners shall recommend to the county commissioners of each county in the State on or before the first day of

August, a levy of not more than 3 mills on the dollar, on all property in such township, and it shall be the duty of the county clerk to place such levy on the tax rolls of said county; provided, that at least 75 per cent of all moneys collected from such levy in each township shall be used to improve the rural route and township roads therein.

All male persons between the ages of twenty-one and fifty years, who have resided in the State thirty days and who are not a public charge, shall be liable each year to pay the sum of \$3 to the township trustee or to the proper officer of the city in which such person lives, and the same shall be expended on the public roads within such township or city (L. 1911, no. 1008, sec. 34-36).

Each township trustee within his township shall erect and keep up, at the expense of the township, mile posts and guideboards at the forks of every State and county road, and posts or boards at the fords of every river or creek that in high water becomes impassable. The said township trustee shall also remove or cause to be removed all obstructions and encumbrances such as brush, hedge trimmings, rock and debris and obnoxious weeds at least once a year, the county reimbursing the township for all such removals of obstructions, etc., performed on county and State roads (L. 1911, no. 1008, sec. 37-43).

All persons owning or operating steam or gasoline threshing machines, saw mills, transfer wagons or vehicles of any kind used for transportation and distribution of oil or merchandise in moving the same over the public highway are required to lay down planks not less than one foot wide, three inches in thickness, and of sufficient length, on the floor of all bridges and culverts situated on the public highway, while crossing the same, for the wheels of said engine of any kind to run while crossing such bridge or culvert; provided that this shall not apply to any machine or engine not exceeding three tons in weight.

All persons owning, controlling, operating or managing steam traction engines of any kind along the public highways are required on meeting any person or persons in vehicles of any kind drawn by horses, mules or other animals, to turn to the right, giving as much of the public highway as possible, and then shut off the steam and come to a halt at the distance of one hundred yards from the person or persons so met.

Conviction of the violation of this requirement is subject to a fine of from \$5 to \$200 for each offense (L. 1911, no. 1008, sec. 45-47).

It is unlawful for any person to ride or drive any horse, mule or ox over any bridge in the State faster than a walk or drive more than fifty head of cattle on such bridge at one time, and any person or persons so unlawfully riding or driving shall pay a fine of \$5 and

cost of suit. It is also made a misdemeanor to plow up a public highway, injure any mile stones or guide posts or wilfully destroy any portion of a public highway bridge or culvert (L. 1911, no. 1008, sec. 48-52).

Convict Labor.—It is the duty of the warden of the penitentiary to employ the surplus convict labor in extending and repairing the State and county roads (Acts of 1905, ch. 42, sec. 73).

By virtue of a special act of the legislature, a macadam road has been provided for from Leavenworth to Kansas City. The bill granting authority for this work provides that if Wyandotte and Leavenworth Counties furnish the right-of-way and material, the State will furnish the necessary labor from the penitentiary; estimated cost is \$100,000, and it is expected that it will require two years for the completion of the work.¹²

KENTUCKY

State Aid.—An amendment to the constitution was voted by the legislature and passed on favorably by the people, providing that the credit of the commonwealth may be given to any county for public road purposes, and that any county may incur any amount of indebtedness not to exceed 5 per cent of the value of the taxable property therein, for public road purposes; provided, such additional indebtedness is approved by the voters of the county at a special election, and that when such indebtedness is incurred, the county shall levy an additional tax not exceeding 20 cents on the hundred dollars for the purpose of paying interest and providing a sinking fund (Acts 1908, ch. 36).

Road Administration.—The county is the unit of administration, the county or fiscal court having jurisdiction over all roads, said county or fiscal court appointing a county road supervisor. The county court of each county is required to divide the county into road precincts or districts, fix the boundaries of same, assign the hands to each and appoint a road overseer for each.

Constitutional.—The tax rate of counties in taxing districts, for other than school purposes, shall not at any time exceed 50 cents on the hundred dollars of taxable property therein (Sec. 157, Constitution of 1891).

Taxation.—In counties of less than \$3,000,000 assessed valuation, an election may be called to determine whether a tax not exceeding 25 cents on each \$100 shall be levied therein for road purposes, a two-thirds vote being required to carry such an election.

A poll tax of \$1.50 may be levied upon all males of twenty-one

¹² Digest revised and approved by W. S. Gearhart, State highway engineer, March 2, 1912.

years of age and may be applied to the maintenance of the public roads of the respective counties (Sec. 180, acts 1908, ch. 26).

If the fiscal court so decides any tax-payer may work out his road and bridge taxes upon the same terms and compensation as other hands who perform road work (Carroll's *Kentucky Statutes 1903*, ch. 103, art. 1, sec. 4324).

The fiscal court may take stock in companies organized to construct, operate and maintain turnpike, plank and gravel roads in their counties; but in no case are they empowered to subscribe to any company more than \$1250 per mile; and no appropriation therefor can be made, unless a sufficient amount is guaranteed by said company by subscription to complete the road and build toll houses. Said court may levy and collect taxes sufficient to pay such said subscription with the year subscribed (Carroll's *Kentucky Statutes 1903*, ch. 121, art. 3).

Whenever all of the capital stock in any turnpike road in the State is owned by the State and any county or counties and such county or counties will agree to make and maintain said turnpike road free of toll, the commissioners of the sinking fund may donate the stock and interest of the State in such turnpike to such county or counties (Acts 1906, ch. 45).

The owners of the stock of any turnpike companies may also surrender their interests therein to the fiscal court of the county under similar conditions (Carroll's *Kentucky Statutes 1903*, ch. 110, art. 1).

Provision is made whereby upon the written application of 15 per cent of the vote cast at the last preceding general election in any county, the county judge thereof shall order an election to be held at the next regular county election therein upon the proposition of having free turnpikes and gravel roads. If the people so decide by such election, the fiscal court may acquire by gift, lease, purchase or condemnation any or all of the turnpike roads within the county and may provide for the construction of new ones, and may levy taxes each year not exceeding 25 cents on the hundred dollars to pay for and maintain such roads. Such roads shall then be maintained by the fiscal court and be free from toll (Carroll's *Kentucky Statutes 1903*, ch. 129, art. 6, as amended by acts of 1904, ch. 77).

Shade Trees, etc.—The fiscal court of each county may provide for shade trees on any of the public roads of their county, and may also provide for the establishment of wells or cisterns at points along the public roads for the convenience of the traveling public. Sign posts must be erected at the cross-roads (Carroll's *Kentucky Statutes 1903*, ch. 110, art. 1).

Convict Labor.—Persons convicted of felony and sentenced to confinement in the penitentiary shall be confined at labor within

the walls of the penitentiary; and the general assembly shall not have the power to authorize their employment elsewhere, except upon the public works of the commonwealth. . . . (Constitution of 1891, sec. 253).

All male persons confined in county jails or workhouses under sentence of hard labor are available to the supervisor or overseer to work on public highways. The supervisor or overseer shall be responsible for the safe keeping of such convicts while in their care and the said convicts shall be governed, controlled and cared for by the said supervisor or overseer in the same manner as required by law of the superintendents of workhouses and the prisoners shall receive credit for work, as provided by law (Carroll's *Kentucky Statutes 1903*, ch. 110, art. 1, sec. 4322).¹³

LOUISIANA

State Highway Officials.—Under the present law the board of State engineers is authorized to appoint a State highway engineer who holds office until removed for cause by the said board. He must be a competent civil engineer, experienced in highway work and his salary shall not exceed \$5000 per annum, at the discretion of the board. He shall also be required to give bond.

Duties of State Highway Engineer.—The board is authorized to appoint assistants and clerks and provide offices. It holds meetings in its discretion to consider the general policy and the work of the department and to receive the annual report of the State highway engineer. The board acts in all matters concerning recommendations, estimates and appropriations found advisable to be submitted to the governor.

The State highway engineer has charge of all records, plans, specifications, etc. He is required to make a general highway plan of the State; collect statistics; investigate methods best adapted to each section of the State; establish standards for construction and maintenance; determines character, and has supervision over construction and maintenance of State highways in each parish granted State aid, subject to approval of board of State engineers. He or his assistants must make all surveys, plans, specifications and estimates and select materials for said State aid roads. When amount of improvements is over \$2000, bids must be advertised for and required to be accompanied by certified check for 5 percent of bid. State highway engineer may reject any or all bids for cause and do the work with his own force, but otherwise must award to lowest responsible bidder. The

¹³ Digest examined and approved by Hon. M. M. Logan, assistant attorney-general, February, 3 1912.

president or some member of the police jury may be present when bids are opened. Successful bidder must give bond to the amount of one-half of the contract awarded. No bidder accepted as bondsman. State highway engineer, with the approval of board of State engineers, may purchase for the State, rock crushers, steam rollers and other road machinery, also draft animals and supplies necessary, and may loan such equipment to parishes provided that they bear all expenses. He may also employ such labor as he may deem necessary. He is required to take up applications for State aid as far as practicable in the order of their receipt, but he must first determine whether parishes applying have the necessary funds. Contracts must be in the name of the State and signed by the highway engineer and the contracting parties, with the approval of the president of the police jury of the parish. The State highway engineer may authorize partial payments to the contractor not to exceed 80 per cent of the contract price of work as it is completed, but at least 20 per cent shall be held until work is accepted. Upon completion of contract the State highway engineer certifies to the State treasurer and the president of the police jury the portion to be paid by the parish. The State highway engineer is required to keep all roads improved under this act, in repair. The total cost to be paid by the State and the parish to reimburse the State in the same manner as for construction. The State highway engineer is required to organize a system of repair so that the roads shall be in good condition at all times.

Duties of Local Officials.—Police juries of parishes may make application to State highway engineer for State aid for main traveled roads. Police juries must be notified by State highway engineer the time for opening bids, the president or some other member may be present to concur. Proportion of cost of State aid roads must be paid by police jury within thirty days. Contracts made by State highway engineer must have written approval of the president of the police jury of parish. Parish must reimburse State for its proportion of cost of maintenance in the same manner as for construction. Rights of way must be acquired by parish, by purchase, donation or expropriation. In expropriating lands for right of way the measure of damages to such land owner shall be doubled the assessed value of the property per acre appearing on the last assessment rolls.

State Aid Funds and Distribution of Cost.—Total cost under provision of this act to be paid by State treasurer on warrant of State highway engineer approved by president of board of State engineers. The parish is required to refund one-half of the cost of construction and maintenance. In order to provide funds to carry out this act all surplus revenues received by the oyster commission and the game commission and from any State vehicle

tax and all other revenues which may be appropriated or designated for the purpose constituting "the State highway fund." Any portion of this fund unexpended in one year may be expended the next fiscal year. The said fund shall be apportioned by the said State highway engineer, by and with the approval of board of State engineers. A general property tax of one-fourth of 1 mill is levied by the State and the proceeds placed in State highway fund.

Convict Labor.—The State highway engineer, with the approval of the board of State engineers may under certain conditions and circumstances use convicts for highway work, such convicts to be under the supervision and guardianship of the board of control of the State penitentiary. The labor performed to be furnished free of charge, but the cost of maintenance and operation to be borne by the parish, municipality or road district having the work performed and paid out of the fund available for said work.

Local Road Legislation.—Jurisdiction over roads vests in the police juries of the respective parishes and they may divide each parish into convenient road districts and appoint a road overseer for each.

For the purpose of paving and improving roads, a municipal corporation, drainage district or parish may submit to vote the question of levying a special tax or issuing bonds for that purpose. Such special tax shall not exceed 5 mills on the \$1 in any one year. If bonds are issued the amount of such bonds shall not exceed one-tenth of the assessed property valuation in such municipal corporation, drainage district or parish.

Every able-bodied male, between eighteen and fifty years of age, unless exempt by law, may be required to work, not exceeding twelve days annually, on the public roads, or to commute for same at the rate of \$1 for each day's work so required.¹⁴

MAINE

State Aid.—The State aid law provides for a system of State roads to be improved through coöperation between the State and the municipality. When any town votes to accept State aid the county commissioners in the county in which said town is located on or before June 1, shall determine the main traveled thoroughfare of said town and designate the same as the State road and they shall return to the State commissioner of highways a careful description of each road so designated. Upon petition to the State

¹⁴ Digest revised and approved by Mr. C. C. Sandoz, secretary, State highway department, January 3, 1912.

commissioner of highways and hearing thereon, the location of the State road by county commissioners may be changed. When the State road in any town has been reconstructed in a permanent manner the county commissioners shall then designate the next important main thoroughfare as State road.

If any city, town or organized plantation, or the county commissioners, acting for unincorporated townships, desire State aid for the improvement of State roads they shall raise an amount in addition to their regular road revenue as follows: towns having a valuation of \$200,000 or less may appropriate any amount not exceeding \$200; towns having a valuation of \$200,000 and not over \$800,000 may appropriate any amount not exceeding \$400; towns having a valuation over \$800,000 and less than \$1,000,000 may appropriate any amount not exceeding \$450; and towns having a valuation of \$1,000,000 and not exceeding \$3,000,000 may appropriate an additional \$50 for each \$200,000 additional valuation or fraction thereof; towns having a valuation of \$3,000,000 and less than \$4,000,000 may appropriate \$1000; and towns having a valuation of \$4,000,000 or more may appropriate an additional \$100 for each \$1,000,000 additional valuation or fraction thereof. The commissioners of each county in which are located unincorporated townships shall if they desire State aid for said townships raise in addition to the regular road revenue 50 cents for each \$1000 of valuation in said townships. City governments may make appropriations to secure State aid.

Applications for State aid shall be made to the State commissioner of highways on or before April 15, of each year by the clerks of cities, towns, plantations or boards of county commissioners except that in cities the time may be extended to June 15. The voters shall determine at the annual town meeting whether or not they will make the necessary appropriations of money to entitle the town to State aid.

The State commissioner of highways shall apportion the money appropriated by the legislature for State aid to the cities, towns and organized plantations which have applied for State aid and appropriated the additional amount necessary to secure such State aid as follows: for each \$1 so appropriated by towns having a valuation of \$200,000 or less, \$2; the towns having a valuation of over \$200,000 and less than \$1,000,000, \$1 for each \$1 appropriated by said towns; towns having a valuation of \$1,000,000 and less than \$1,200,000, 92 cents; towns having a valuation of \$1,200,000 and not exceeding \$1,400,000, 85 cents; towns having a valuation of \$1,400,000 and not exceeding \$1,600,000, 80 cents; and to towns having a valuation of \$1,600,000 and over, 75 cents for each \$1 so appropriated by said towns. Each unincorporated town shall receive \$1 for each \$1 appropriated. On or before May 15, of each year the

officers having jurisdiction over highways which are to receive State aid shall file with the State commissioner of highways a proposal setting forth the location on a State road and the nature of the improvements desired to be made, and such proposal shall be subject to the approval of the State commissioner of highways. If he approves the same he shall issue specifications and no State aid shall be paid until the work undertaken has been constructed to his satisfaction.

He may furnish an engineer or inspector to towns free of charge, any special expenses incurred in providing such engineers and inspectors shall be paid out of the general appropriation for State aid. The selectmen of towns shall file statement with the commissioner of highways upon the completion of the State road showing the cost of the road, and survey notes, copies of all plans and contracts and other records shall be filed in the office of the State commissioner of highways. Any part of said joint fund not expended during the year in which it is apportioned may be expended in the succeeding year.

The State commissioner of highways may make surveys, plans, estimates and specifications for the proposed improvement where the amount to be expended is \$1000 or more and shall forward the plans and specifications to the selectmen whose duty it shall be to advertise for bids. Towns may bid upon the work within the town and shall submit their bids to the State commissioner of highways and shall be subject to all the requirements made of the other bidders except that they shall not be required to submit certified check with their bid or give bond. State commissioner of highways may appoint inspectors if he deems it necessary, and their salary shall be charged against the joint fund.

Maintenance of State Roads.—Any highway improved as a State highway by the expenditure of the joint fund shall be maintained by the city, town, plantation, or township, to the satisfaction of the State commissioner of highways.

State Highway Department.—To carry out the provisions of the State aid act a State highway department was created whose chief officer is called the State commissioner of highways. He shall be a civil engineer and shall be appointed by the governor with the advice and consent of the council. His term of office shall be four years and he shall receive an annual salary of \$2500 and his actual expenses not to exceed \$1500 annually. He shall have suitable offices at the seat of government and may appoint subject to the approval of the governor and council, an assistant commissioner who shall be a civil engineer experienced in road building. He may employ such other help as the execution of this act shall make necessary. The State commissioner of highways shall compile statistics, disseminate information, hold meetings and make

annual report to the governor and council, showing number of miles, cost and character of roads built, etc.

Appropriations for State Aid.—An appropriation of \$250,000 per annum is made for the purpose of carrying out the purposes of this act. After providing for the payment of State aid applied for, the balance of the fund may be expended by the State commissioner of highways in improving the main thoroughfares of through travel in the State with the object of establishing a complete system of continuous main highways throughout the State, the location of such main highways to be determined by the State commissioner of highways subject to the approval of the governor and council.

Main Trunk Line State Highways.—A designated route is described in the road laws of Maine upon which the State commissioner of highways is directed to expend such moneys as may be available from time to time, the route beginning at Kittery and running through a number of towns to Fort Kent which will be the northern terminus. Another route is designated beginning at Portland and running through a number of towns to Augusta connecting there with the first designated route.

General Road Laws.—The unit of road administration in Maine is the township which, generally speaking, is 6 miles square. For municipal purposes, townships are incorporated either as cities, towns or plantations. There are also unincorporated townships in the unsettled portions of the State. All funds for the improvement and maintenance of roads and bridges are raised by an annual cash tax upon all property within the township in which the roads are located. In cities the amount is determined by the city government; in towns and plantations the amount is determined by the voters at an annual town meeting; in unincorporated townships the amount is determined by the county commissioners of the county in which the township is located.

Improvements are determined upon in cities by a vote of the city government after a recommendation by the committee on streets of said government. The work is under the direction of the superintendent of streets. He hires men and teams, makes up pay rolls and approves them, and purchases small supplies. Purchases of any importance are made by the committee on streets. In towns, the board of selectmen (in plantations the board of assessors, there being no selectmen) decide on what improvements shall be made, and purchase all material and equipment of any consequence. Road work is under the supervision of the road commissioner, who is elected at the annual town meeting. He hires men and teams and purchases small tools and supplies if directed to do so by the selectmen. In unincorporated townships.

the county commissioners determine what improvements shall be made, purchase such equipment and material as is necessary, and the work is done under the supervision of an agent appointed by them.

County commissioners may lay out, alter, or discontinue highways leading from town to town, or grade hills in such highways. They may also be called upon to define the bounds of such a highway when, for any reason, the bounds have become obliterated or obscured. In either of these cases, they make record of their proceedings, and the road is then known as a county road, although the county bears no part of the expense of construction or maintenance of the road.

Municipal officers of cities, towns, and plantations may lay out, alter or discontinue roads which are of purely local importance. The initiative is by petition of a certain number of citizens, and before the proceedings are complete the municipal officers must make record of their doings and return the proceedings to, and have them approved by, a town meeting regularly called. In case the municipal officers refuse to act on a petition, an appeal may be taken to the county commissioners, and they have the jurisdiction which originally vested in the municipal officers.

Occasionally, the opening and construction of a new road, or the construction of a bridge of considerable magnitude, or any other extraordinary road expenditure, is passed upon by the voters at the annual town meeting, or at a special town meeting called for the purpose.

The statute-labor tax was abolished in 1897.¹⁵

MARYLAND

State Roads Commission.—State road work in Maryland was begun by the act of 1898, when an annual appropriation of \$10,000 was made payable to the Maryland geological and economic survey (established in 1896) for the purpose of enabling the survey to investigate the existing road conditions in Maryland, and to furnish plans, expert advice and supervision to the counties of the State. As a result of the work under this act, the State aid law appropriating \$200,000 annually was passed in 1904, and its administration placed in the hands of the Maryland geological and economic survey. Under this act, the counties were further encouraged to attempt modern road work through the financial aid of the State to an extent of one-half the cost of such

¹⁵ Digest based upon information given by Parker L. Hardison, State Commissioner of Highways, December 26, 1911. Local digest prepared by Paul D. Sargent, Assistant Director, U. S. Office of Public Roads, April 3, 1912.

work. In 1906, the legislature made a further appropriation of \$90,000 to be applied by the Maryland geological and economic survey to the improvement at the expense of the State alone, of the direct route between Baltimore and Washington, which was called in the act State road no. 1, and subsequent legislatures have added several times the original appropriation to this same fund for the purpose of completing the improvement of this road.

The work under these earlier acts was so successful that in 1908, the legislature authorized the construction by the State of a system of main artery roads in and through all the counties of the State at the expense of the State alone, and provided for a bond issue by the State of \$5,000,000 toward this end. In 1910, the legislature added another \$1,000,000 for the purpose of covering the cost of construction of a direct route from Baltimore to the capital at Annapolis and the cost of several inter-county bridges necessary to make the original system effective in certain localities.

The act of 1908 created an independent road commission of six members to be appointed by the governor for the carrying out of the work under the State road loan one-half of the membership to represent the geological survey. The act of 1910 relieved the geological survey of all road work and placed, after June 1, 1910, the administration of the State aid law and the Baltimore-Washington road act in the hands of the State roads commission. At the same time, the act of 1898 which covered an appropriation of \$10,000 for technical advice and assistance was repealed. At the time of the transfer of the work of the geological and economic survey to the State roads commission, over 350 miles of road had been surveyed, and plans and estimates had been made on 275 miles of these, aggregating something over \$2,000,000. Of this mileage, $146\frac{1}{2}$ miles had been accepted as completed from the contractors, while 46.38 miles were still under contract and in various stages of construction, but on the average more than 50 per cent completed. In addition several miles of road had been built for the counties through the supervision of the survey, but at the request and expense of the counties themselves. The work on more than 200 miles had thus been inaugurated and for the most part completed by the geological and economic survey at the time of the transfer of its work to the State roads commission.

Since June 1, 1910, all the road work of the State has been in the hands of the State roads commission. To January 1, 1912, the road operations of the State may be summarized as follows:

State Roads.—Surveys have been made aggregating $695\frac{1}{2}$ miles. Plans and specifications have been prepared for $378\frac{3}{4}$ miles. Contracts and other arrangements have been made for work aggregating $348\frac{3}{4}$ miles. Work has been accepted as completed aggre-

gating $168\frac{1}{4}$ miles, and work is now under way (on the average 70 per cent complete) aggregating 176 miles.

State-aid Roads (including work done previous to June 1, 1910).—Surveys have been made aggregating 359 miles. Plans and specifications have been prepared aggregating 281 miles. Contracts or other arrangements have been made aggregating 195 miles. Work has been accepted as completed aggregating $166\frac{1}{4}$ miles, and work is now under way (averaging 70 per cent complete) aggregating $19\frac{1}{8}$ miles.

Baltimore-Washington Road (including work done previous to June 1, 1910).—Surveys have been made aggregating $39\frac{1}{4}$ miles. Plans and specifications have been completed aggregating 33 miles. Contracts or other arrangements have been made aggregating $25\frac{1}{2}$ miles. Work has been accepted as completed aggregating nearly 20 miles, and work is now under way, and nearly complete, on a section one-eighth of a mile long, while another section of about $4\frac{3}{4}$ miles is under contract, but just begun.

State Road Laws.—Under the State road law, the State roads commission selects the State road system to be improved and proceeds with its improvement in the discretion of the commission and out of the proceeds of the State road loans provided for this purpose. The State roads commission has entire control in the premises.

The maintenance of the State roads is performed by the State roads commission direct, and toward this work, a proportion of the net revenues of the automobile license law is available. The balance that may be necessary for this purpose must be provided by the commission from its other funds. While the maintenance systems of the different counties are not uniform, the State roads commission had adopted a very complete system involving the employment of permanent patrolmen and similar to that in effect in France.

State Aid Road Law.—Under the State aid law, the counties apply annually for the State aid desired, and when application is approved by the State roads commission, plans and specifications for the work are prepared by the State, the contract for the work being let by the counties subject to the approval of the State, and the performance of the contract supervised by the State. On the completion of the work, its cost is shared equally by the State and the counties. The allotment of the State funds for the above purpose is made to the counties in proportion to their various public road mileages.

After the construction of a State aid road, its maintenance devolves on the county authorities under the supervision and subject to the approval of the State. A proportion of the net revenues from the automobile license law is available to the coun-

ties toward their reimbursement for these expenditures of maintenance on State aid roads.

Baltimore-Washington Road Law.—While improved under special appropriations made by the legislature for this road, it is practically a part of the State road system, and under the direct control of the State roads commission. Both construction and maintenance work on it follow the same lines as on any other portion of the State road system.

Automobile Law.—Above references to the revenues from the automobile license law proceed from the fact that the State law concerning the licensing of automobiles provides that the net revenues from the license shall be turned over to the State treasurer "who shall create a special fund thereof, and on the first day of April in each year one-fifth thereof to be paid to the mayor and city council of Baltimore for use on its roads and streets, and the balance to be used for the oiling, maintenance and repair of the modern roads now being built by the State and counties and for no other purpose. Disbursements of the remaining four-fifths from this fund shall be made by the treasurer to the counties on drafts and expenditures which have actually been made in repairs on State aid roads certified to by the State roads commission, and to the State roads commission for expenditures which have actually been made in repairs on State roads constructed by that body, on drafts from such body itself. The State roads commission shall not receive in any year out of the whole fund available for distribution, a greater proportion than the proportion which the total mileage of State roads completed to April 1 of any year shall bear to the total mileage of both State aid roads and State roads completed to that date. And no county shall receive in any year from such fund a greater proportion than its total mileage of State-aid roads bears to the total mileage of State aid roads completed before April 1 in any year. The remainder of said funds shall be distributed among the counties in the proportion aforesaid."

Local Road Administration.—Jurisdiction over roads vests in the board of county commissioners, who are made a corporation and given full power to appoint road supervisors and other county officers, not otherwise provided for, to construct county roads and bridges and, if deemed to the best interests of the public, may commit the construction and repair of roads and bridges to the charge of competent civil engineers.

All road taxes are paid in cash.

The boards of county commissioners levy all taxes for road purposes, no specific levy being provided by statute. In some counties the said boards levy a special road tax, while in others the money for road building purposes is appropriated from the general fund.

There is no general county bonding law. It is necessary in each case for the legislature to pass an act to authorize a bond issue, it must then be published for two months prior to the next election of members for the House of Delegates in the newspapers published in the county and shall also be approved by a majority of all the members elected to each house of the general assembly, at its next session after such said election.

Maryland Digest.—For a number of the counties special laws have been passed compelling the employment of roads engineers, the first one being in the case of Baltimore county by the legislature of 1900. Fourteen counties now have such officials and before the legislature now in session adjourns, it is probable that several other counties will be so provided.¹⁶

MASSACHUSETTS

Summary of Highway Laws.—In general, the highways in Massachusetts are divided into three classes, State highways, county highways, and city or town ways. The county, city or town ways are cared for by the municipal authorities, viz., superintendents of streets, road commissioners and highway surveyors. The provisions in cities are various, the jurisdiction being sometimes placed in boards of commissioners and sometimes in boards of aldermen. The appropriations for either improvements or repairs are made by the city government or at a town meeting.

County commissioners, upon proper petition and after due hearing, have authority to lay out new ways or to widen and improve existing ways and order specific repairs to be made thereon. They may direct a city or town to make specific repairs, or the county commissioners may make such repairs themselves and determine what part of the cost thereof shall be paid by the city or town benefited. The county assesses a tax on the municipalities and this tax, as well as the State tax, is collected by the towns and cities in connection with the municipal tax.

Cities and towns, acting through their proper authorities, also have authority to lay out and construct new ways and to widen and improve existing ways and, naturally, can direct their improvement and appropriate money therefor.

Massachusetts Highway Commission.—The Massachusetts highway commission was established in 1893. It consists of three members appointed by the governor with the advice and consent of the council, to serve for a term of three years, one term expiring each year. Salaries: Chairman \$5000; commissioners, \$4000 each.

¹⁶ Digest prepared by State roads commission, March 14, 1912.

Duties.—The duties of the commission at present relate to three subjects, roads, automobiles and the supervision of telephone and telegraph companies.

Automobiles.—It registers motor vehicles, licenses the operators thereof and may make regulations not inconsistent with the law, concerning the operation of motor vehicles. It investigates automobile accidents, having a corps of investigators for that purpose, and it may suspend or revoke the licenses of operators and the registration of motor vehicles for proper causes, and must do so when the person holding a license or registration certificate is convicted in court of certain offenses.

Telephone and Telegraph Companies.—It has general supervision of these companies; is required to investigate complaints as to service and charges therefor; and may, from time to time, make recommendations upon schedules of rates and charges or other matters relating to the business of such companies.

Highways.—Its duties in relation to highways are two-fold; first the collection and collation of statistics as to road materials, etc., the making of maps, naming of highways and the giving of advice on road matters to the various authorities throughout the commonwealth who have charge of road building or road maintenance; and second, the laying out and construction of State highways and the improvement of certain town roads.

State Highways.—Since 1894 appropriations have been made by the legislature for the construction of so-called State highways, the money being raised by a bond issue, usually authorized in five-year periods.

The Massachusetts highway commission may lay out as a State highway a new or existing way in any city or town upon petition of the city government, board of selectmen or the county commissioners. When a road is so laid out it is maintained by the commission, under the law, and the commission has entire jurisdiction over it, even to the extent of determining the locations of water and gas mains, poles and other structures. No work can be done on any State highway, nor can any tree located within the limits of such a highway be cut without a permit from the commission.

A road becomes a State highway when copies of the petition, layout plan and adjudication are filed in the offices of the clerk of the county commissioners and the clerk of the city or town.

When a State highway is laid out and constructed by the commission the county in which it is located pays 25 per cent of the cost of construction.

Small Town Roads.—The commission also has a certain sum of money, to wit: 15 per cent of the amount appropriated for State highway construction, which it may spend under the so-called

small town act as follows: 5 per cent in towns of less than \$1,000,000 valuation upon petition, the town making no contribution; 5 per cent in towns of less than \$1,000,000 valuation upon petition, the town contributing an equal amount, and 5 per cent in towns of more than \$1,000,000 valuation upon petition, the town contributing an equal amount.

These roads remain town ways and the towns are responsible for their maintenance and for any accident which happens thereon. The commission has authority, however, to repair such roads and to charge back to the towns in which they are located the cost of the repairs, not to exceed \$50 a mile a year.

The Work Accomplished.—There are 33 cities and 321 towns in the commonwealth of Massachusetts. Since the improvement of highways was started, under the highway commission, the commonwealth has expended nearly \$8,500,000 in the construction of State highways and work under the small town act, including the planting of trees.

There are now 879 miles of State highway located in 250 cities and towns throughout the commonwealth, and about 260 miles of road have been improved under the small town act, the roads being located in 144 towns.

The commission has also spent over \$64,000 in improving through routes in 44 small towns, this money being available for this purpose as hereinafter set forth, from the automobile fees, having been made available only two years ago.

This does not represent, by any means, all the expenditures for improved highways, because in many instances towns, street railway corporations and individuals have contributed large sums of money toward the construction of State highways and bridges.

In some cases the towns have borrowed the money and have constructed highways which the commission has taken over after they were constructed, the construction of which involved no expenditure on the part of the commonwealth.

Amount Available for Construction.—The amount available at present under existing laws is \$500,000 a year for State highway construction and work under the small town act. This is raised by the issue of bonds, and the counties in which the roads are located repay to the commonwealth 25 per cent of the amount expended for this purpose.

Maintenance.—In the year 1911 the commission received a direct appropriation from the commonwealth of \$200,000 for the maintenance of State highways and it also had available something over \$300,000 from the motor vehicle fees fund for the same purpose.

Under the automobile law, all the net automobile fees and fines, after paying the expenses of administration (which in Massa-

chusetts include number plates, expense of investigating and reporting on accidents, many hearings a week and sometimes prosecutions) are available for the repair and maintenance of State highways and for the construction and improvement of town roads. Of this net amount, 20 per cent may be spent by the commission, upon petition of the selectmen, in the repair, improvement or construction of through roads connecting one city or town with another; the roads remaining town ways. The other 80 per cent of the net amount is available for the repair, maintenance, oiling, etc. of State highways.

For work on the through routes in the towns there was something over \$70,000 available from the motor vehicle fees fund in 1911.

The counties repay to the commonwealth 25 per cent of the money expended for maintenance that is received from the legislative appropriation, but no part of the money that is expended from the motor vehicle fees fund.

The town in which a State highway is located repays to the commonwealth a part of the actual cost of maintenance, the same not to exceed the sum of \$50 a mile a year and in no event more than the actual amount spent. This is levied together with the State tax.

Advice to Road Authorities.—The commission, through its engineers, upon petition of the county or municipal authorities, furnishes engineering advice in relation to road construction and maintenance. It is now a very common occurrence for city or town authorities to request the advice of the commission and its engineers, and this is always given.

In many cases the request comes from the superintendent of streets or other officer in charge of the road work in the city or town.

In many instances the commission acts as engineer for the city or town in making the preliminary surveys, plans and estimates, preparing the contract and specifications and advertising for bids for the local authorities; also in supervising the work and certifying the amount of money due the contractor from time to time.

On many occasions the commission has also drawn plans for bridges, etc., for the county authorities and acted as engineer under the contracts.

Actual Work.—When a State highway is to be laid out or work is to be done under the small town act the commission in the first instance offers the contract to the city or town in which the highway is to be located, the contract being based on prices satisfactory to the commission. If acceptable to the local authorities, the contract is let to them, and the work is performed under the direction of the commission and its engineers.

Contracts for State highway construction are almost invariably based on a given unit price for each item of work, while "small town" contracts are made on the "lump sum" basis, the contracts providing for the improvement of a certain length of road in accordance with certain specifications. In every instance the work is required to be done to the satisfaction of the commission's engineers.

If the local authorities do not elect to take the contract, bids are advertised and are publicly opened and read; and while the commission reserves the right to reject any or all bids, it usually lets the contract to the lowest bidder.

Organization.—There is a central office in Boston, with three commissioners, a secretary and various assistants in the highway department; an automobile department, having charge, under a chief clerk, of the registration of motor vehicles and the licensing of the operators thereof, and a department in charge of examinations and investigations. A chief engineer has entire charge of all engineering work, and under him are assistant engineers at the central office, who have charge of the office engineering force, the making of plans and estimates, the drawing of contracts, etc.; and five division engineers in charge of the roads in their respective divisions. They also have assistants and resident engineers who are assigned to particular pieces of work, and each division engineer has his own office, one being located in Boston, one in Middleboro, one in Pittsfield, one in Greenfield and one in Worcester.

Local Road Legislation.—The boards of county commissioners have general authority over the highways in their respective counties.

The selectmen of the town exercise original and concurrent jurisdiction with the board of county commissioners over highways within their respective towns. Appeals may be made to the county commissioners from decisions of selectmen in road matters.

The funds for road purposes are appropriated by the town meetings and are then raised by taxation, as for other town purposes.

The counties assess on the towns the amount necessary to meet the State appropriation for highways and other purposes.

County road bonds may be issued upon approval of the general court, no limitation of amount being specified.¹⁷

¹⁷ Digest except "Local Road Legislation" prepared by Hon. Wm. D. Sohler, State highway commissioner, under date of January 12, 1912.

MICHIGAN

The Michigan State highway department by virtue of a law enacted in 1905 and amended in 1909 and in 1911 is in charge of the State highway commissioner, who has been, since the organization of the department, appointed by the governor, with the advice and consent of the Senate, to hold office for four years. In the year 1913, and every four years thereafter, a State highway commissioner shall be nominated and elected by the people of the State of Michigan at the same time and in the same manner as the justices of the supreme court are nominated and elected. He shall be a citizen of the State, shall be furnished with offices at the State capitol and shall receive an annual salary of \$2500 and may appoint a deputy, who shall be a competent engineer, and may employ such clerks and other employes as may be necessary to carry on the work of the department in an efficient and economical manner. The governor shall fill vacancies in the office of the commissioner, but such appointee shall hold office only until the next general election.

Duties of State Highway Officials.—The State highway department shall give instruction in the art of building and maintaining public roads and bridges; shall collect reports from township and county highway commissioners, superintendents or commissioners of streets; and shall distribute any state reward provided by the legislature for improving public roads or any funds that may be given to the State for such purposes by the United States government or by individuals. The commissioner shall make a biennial report to the governor on or before February 1 every odd year and shall supply every township highway commissioner in the State with a copy and such further number as may be necessary to supply public demand. The State highway commissioner shall furnish outline, plans and specifications for the improvement of public roads and when requested he shall go or send someone to give expert advice regarding the construction of public roads or bridges where the proposed improvement is of sufficient importance to warrant such action. He shall gather all possible information about road materials and give this information to any road or street officials upon request, free of charge. He shall keep a complete record of the doings of the State highway department and shall, as soon as possible, make a map of every township in the State showing the roads and their condition and the location, kind and quality of road materials, etc. He shall enter applications received from township boards or county commissioners for the allotment of State rewards and shall make allotment of funds in the State treasury in compliance with the provisions of the law. He is given authority to refuse any further

road reward to any township or county that has been rewarded by the State for improving roads and has failed to keep such roads in proper repair. He shall, however, inform the township or county officials of what repairs are necessary and if such repairs are made satisfactory to him he shall reinstate such township or county to the eligible reward list. His decision shall be final as to whether a road is built well enough to merit State reward and he shall have the right to withhold any portion of the reward until the road has been thoroughly tested.

Duties of Local Officials.—The highway commissioners of the several townships in each county, under the direction of the township board, have the care and maintenance of all earth roads and have the authority to construct and maintain State reward roads under the direction of the State highway commissioner. County road commissioners have the construction, care and maintenance of all roads, which said board may take over from townships and have authority to construct and maintain State reward roads under the direction of the State highway commissioner, and to construct and maintain all county roads, designated as such by the boards of supervisors of the various counties working under the county system, and also have the authority, under the direction of the boards of supervisors, to expend the county road tax for highway purposes.

At the request of the State highway commissioner, every township highway commissioner, and every board of county road commissioners and every village or city superintendent or commissioner of streets shall make a sworn report to the State highway commissioner on or before December 1 in each year, answering any questions that the State highway commissioner may deem proper to ask concerning road materials, machinery, etc. Upon the refusal or neglect of such local road authorities to make such report at the time stated, or within thirty days thereafter, or if they shall make a report which shall be wholly or partly false, they shall be deemed guilty of a misdemeanor and upon conviction thereof fined not less than \$10 nor more than \$100 and costs, and be confined in jail not less than ten nor more than thirty days for each offense. Each township highway commissioner is assisted in his duties by one or more overseers of highways. All work done upon roads, except repair work, has in view the permanent improvement of all highways. Before beginning any improvement work, the township commissioner of the board of county road commissioners cause a survey to be made by a competent engineer for the purpose of establishing both grade and location and to furnish information for the scientific construction of the proposed highway under the direction of the township highway commissioner or the board of county road commissioners.

Taxes.—All highway taxes, in Michigan, are paid in cash and the money is disbursed, in townships, by the township highway commissioner and township board; in counties, by the board of county road commissioners, acting under the direction of the board of supervisors; the State reward road fund, by the State highway commissioner, as designated and directed by the statutes.

State Highway Funds and their Distribution.—Whenever any township board or county commissioners have made arrangement to improve a mile or more of public road by constructing a sand clay, gravel, stone-gravel, gravel-stone, macadam or concrete road and shall ask for an allotment of State reward, and shall file with the State highway department a profile of the road to be improved made out by a competent civil engineer, and shall make application for plans and general specifications, the State highway commissioner shall enter such application, furnish plans and specifications, and allot funds from the State treasury as a State reward, if, after completion, he shall find the road to be up to the required standard, he shall verify the same to the auditor general of the State, who shall direct a warrant upon the State treasurer payable to the proper authorities in such township or county for the amount of reward due them as hereinafter provided. Each surveyed township is entitled to receive State reward on not less than one nor more than three miles in any one fiscal year. The following described roads when constructed shall merit State rewards attached to each description:

(a) Every mile of well graded road on which the steepest incline shall not exceed 6 per cent, and the width of which shall not be less than 20 feet between and exclusive of side ditches, and which shall be properly drained, and have a wagon way or travel track not less than 9 feet wide, made of a mixture of sand and clay or other material according to specifications furnished by the State highway commissioner, shall merit, if approved by the State highway commissioner, a reward from the State of \$250 and pro rata for extra miles and fractions thereof in excess of the first mile.

(b) Every mile well graded with the steepest grade not exceeding 6 per cent, and not less than 20 feet between ditches, properly drained, with travel track not less than 9 feet wide, and which shall consist of not less than 8 inches of compacted gravel applied in not less than two courses, each layer rolled separately, shall merit, if approved by the State highway commissioner, a reward of \$500 a mile and pro rata for extra miles and fractions thereof in excess of the first mile.

(c) Every mile with grade not exceeding 6 per cent, and not less than 20 feet between ditches, properly drained, with travel track not less than 9 feet wide made in two courses, bottom course of crushed stone, slag or other material, and not less than 4 inches

thick after thorough rolling, and a top course consisting of a layer of gravel not less than 3 inches thick after graveling, shall merit, if approved by the State highway commissioner, \$750 per mile and pro rata for extra miles and fractions in excess of the first mile.

(d) Every mile with grade not exceeding 6 per cent, and not less than 20 feet wide between ditches, properly drained, travel track 9 feet wide made in two courses, the bottom course to be of gravel, slag or other material as approved by the State highway commissioner, and not less than 4 inches thick after rolling, and a top course of crushed stone not less than 3 inches thick after rolling and properly bonded, shall merit, if approved by the State highway commissioner, \$750 a mile and pro rata for extra miles and fractions in excess of first mile.

(e) Every mile with not exceeding a 6 per cent grade, 20 feet wide between ditches, properly drained, travel track not less than 9 feet wide, of well compacted macadam not less than 6 inches thick, laid in not less than two course of crushed stone, each to be properly bonded with stone screenings, asphaltic, bituminous or other cement approved by the State highway commissioner and thoroughly rolled: Provided, that both shoulders and metal track shall be properly crowned so as to shed water quickly to the side ditches, shall merit, if approved by the State highway commissioner, \$1000 per mile and pro rata for extra miles and fractions in excess of the first mile.

(f) Every mile of well graded road on which the steepest incline shall not exceed 6 per cent, and the width of which shall be not less than 20 feet between side ditches, and which shall be properly drained, and have a wagon way or travel track not less than 9 feet wide in the clear between beveled edges and which shall consist of properly laid concrete not less than 6 inches in depth, composed of Portland cement and gravel, of sand and crushed stone, with or without a paving brick surface: Provided, however, that the cement shall be required to meet the standard tests then in force of the American Society for Testing Materials, and that the other ingredients, the manner of laying and the kind of inspection employed shall be made to comply with specifications made by, or approved by the State highway commissioner, shall merit, if approved by the State highway commissioner, a reward from the State of \$1000 per mile and pro rata for extra miles and fractions thereof in excess of the first mile.

Two or more townships or two or more counties may act jointly in the improvement of boundary line roads under the provision of this act. If there are not sufficient funds in the treasury to meet the applications for State reward, said applications shall be filed and allotment made as soon as there are available funds.

If a township or a county shall have raised money to build a mile or more of road such as merits State reward, then the road shall be approved by the State highway commissioner, such townships or counties shall draw from the State reward fund each year until the township or county shall have received the equivalent of the reward, provided the road is kept in as good condition as when approved by the commissioner.

There has been appropriated, for the use of the State highway department, for the fiscal year ending June 30, 1912, \$250,000; and for the fiscal year ending June 30, 1913, \$250,000, of which \$10,000 each year is set apart for the running expenses of the department, and the balance constitutes the State reward fund. Any portions of these funds unexpended at the close of any fiscal year shall be carried over and added to the fund for the succeeding year.

Convict Labor.—The legislature of 1909 made provision whereby county road officials could have the use of and direct the employment of county prisoners, confined for petty offenses, upon the highways in the county. The legislature of 1911, additionally, provided that upon proper application by highway officials to the wardens of the various State penitentiaries, State prisoners might be put to work upon the highways in the same manner that county prisoners had heretofore been used, and that such convicts might also be used in surface quarries and stone yards in preparing material to be used on the public highways and hauling the same to the place of distribution, and the State should be remunerated for the service of such convicts by the highway officials.¹⁸

MINNESOTA

State Highway Commission.—The State highway commission consists of three members to be appointed by the governor and to hold office for a term of three years, the order of appointment being such that one new commissioner is appointed each year. The commission is required to elect from its members a chairman and vice-chairman and is provided with an office at the capitol where it shall hold regular meetings not less than once in each two months. The commission is required to appoint a secretary who shall be a civil engineer and practical road builder and who shall be known as the State engineer, to hold office subject to the pleasure of the commission. The commission may employ other officials and assistants and fix their compensation.

¹⁸ Digest revised and approved by Hon. Townsend A. Ely, State highway commissioner, January 3, 1912.

The State engineer and his assistants shall give advice and supervision in road and bridge construction throughout the State under the rules and regulations of the commission and perform such other engineering services as the governor may require for any of the State departments.

The attorney general of the State is ex-officio attorney of the commission.

Whenever practicable the commission shall investigate the location of road materials in the State, ascertain most approved methods of construction, investigate road laws of other States and hold public meetings throughout the State. The commission shall make report to the governor on or before March 1 of each year.

State Aid to Road Improvement.—For the purpose of State aid in the construction and improvement of public highways the law requires that there shall be levied annually on all taxable property of the State a tax of one-fourth mill on each dollar of valuation, and the money so raised together with all moneys accruing from investments in the internal improvement land fund shall constitute a general State road and bridge fund to be expended only on State roads.

On or before the first Tuesday of March in each year the highway commission shall estimate the probable sum of money that will accrue to the State road and the bridge fund and apportion the same among the different counties of the State and notify the State auditor and the boards of county commissioners of such allotments. No county shall receive in one year more than 3 per cent nor less than one-half of 1 per cent of said fund, and in determining the percentage accruing to any one county the commission shall take into consideration the area of such county, the amount of money expended by it in road construction, the difficulty and expense of such construction, and the extraordinary expense connected with the development of new territory.

Designation of State Roads.—Any county board may designate any established road in the county as State road and improve the same in accordance with the regulations of the State highway commission. State engineer shall make all necessary surveys, establish grades, prepare plans and specifications, and have supervision of all work on such designated State roads.

When a county board makes application to the State highway commission for the designation of an established road running into an adjacent county as a State road the commission if it deems it necessary shall so designate the road and determine the part of the cost to be paid by each county.

The word "road" or "highway" is held to include bridges, provided that in no case shall more than one-half of the cost of constructing any road or bridge be paid by the State.

The highway commission may appoint assistant engineers throughout the State for the purpose of superintending work on State roads and they shall act under the instructions of the State engineer. Final payment shall not be made on contracts for road work until the assistant engineer has certified that the work has been properly done according to contract.

Procedure to Secure State Aid.—Whenever a county board shall determine to improve a State road, for which they desire State aid, they shall, if the cost does not exceed \$500 cause surveys to be made, when necessary, by a State assistant engineer and shall then let contract to the lowest responsible bidder or cause same to be done by day labor. If the cost is over \$500 the county board shall cause survey, plans and specifications to be made by the assistant engineer and submit the same to the highway commission for approval, and when such approval has been obtained the county board shall proceed to do the work by contract or day labor under the supervision of the assistant engineer who shall act under the rules and regulations of the highway commission and instructions of the State engineer. After completion of the work the county auditor shall certify the same to the highway commission and submit detailed report of the assistant engineer, and if the highway commission shall approve, the secretary of the commission shall certify the same to the State auditor who shall issue a warrant for one-half of the amount payable to the treasurer of such county but in no case shall the warrant exceed the amount allotted to such county.

Annual Inspection by State Engineer.—State engineer shall make an annual inspection of all bridges exceeding 30 feet in length and report the condition of same to the highway commission and the county board with recommendations.

Appropriations.—An appropriation was made for the fiscal year ending July 31, 1912, and annually thereafter of \$150,000 for State aid and the expenses of the commission, and all unexpended funds in any year shall be carried over to the subsequent year. The sum of \$20,000 of the appropriation was made available May 1, 1911.

All accounts and expenditures shall be certified by the chairman of the commission and paid by the State treasurer upon warrants drawn by the State auditor.

General Laws of the State.—Roads classified as town and county roads, as laid out by either authority.

County can levy two mills on the dollar of their valuation for road purposes. All county funds applied on State roads to be expended under rules and regulations of highway commission. State engineer's department required to give advice and expert

assistance to counties and towns when called on and to superintend such work. Minnesota still has the ancient system of working out road taxes.¹⁹

MISSISSIPPI

Constitutional.—Each county must be divided into five districts, each district to elect a supervisor, the five constituting a board of supervisors, which has full jurisdiction over roads, bridges and ferries, to be exercised in accordance with such regulations as the legislature may prescribe (Con. 1890, art. 6, sec. 170).

The legislature may authorize the employment, under State supervision, of convicts on public roads, or other public works, provided such employment shall not interfere with the preparation or cultivation or good management of the State farm, nor put the State to any expense (Con. 1890, art. 10, sec. 224).

Statutory.—The board of supervisors shall have, in their respective counties, full jurisdiction over roads, ferries and bridges. Each supervisor is to have general supervision over the public highways in his supervisor's district (Code 1906, ch. 17, sec. 307).

The board of supervisors appoints a road overseer for each district. Any person so appointed as overseer and refusing to serve as such shall be fined \$50 for contempt, but no person shall be required to serve as overseer more than one year in every three. Each overseer shall keep the roads of his district in good repair and erect all necessary bridges and causeways and keep the same in repair, so far as possible with the available labor (L. 1894, ch. 70).

The board of supervisors in each county may, in their discretion, appoint a competent person as road and bridge commissioner, with a compensation not to exceed \$5 per day, for days actually served (Code 1906, sec. 446).

The board of supervisors may determine to work a public road, or some part thereof by contract, letting the contracts as other contracts are let by the said board, each road or division under separate contract. A contract shall not be let for a shorter time than two years; but a contract may be let to do specific work, as cutting down a hill, causewaying a marsh or swamp or the like without requiring the contractor to keep it in repair (Code 1906, ch. 123, sec. 4441).

Taxation.—All male persons over eighteen and under fifty years of age, unless exempted by law, shall be required annually

¹⁹ Digest based upon information given by Mr. George W. Cooley, secretary and State engineer, State highway commission, St. Paul, Minn., December 26, 1911.

to perform not to exceed ten days work on public roads or commute the same by the payment of \$5 in cash to the road overseer before being warned, or \$6 after being warned or before defaulting.

The board of supervisors, if the labor and commutation for labor be insufficient for working the roads by contract, may levy a tax upon all the taxable property in the county not to exceed 1 mill on the dollar in any one year. Such taxes shall be kept as a road fund and paid out only on the order of the supervisors. Such taxes, collected within a municipality, which works its own streets, shall be equally divided between the road fund and the municipal street fund. A tax may be imposed contiguous to a shell, gravel or macadam road in addition to the other road tax for constructing or maintaining the road when the property would be greatly enhanced thereby.

If a public road be worked by contract the road hands designated by the board shall work under the contractor or pay the commutation money to him; but a person shall not be required so to work more than five days in a year unless by general order of the board, when not more than ten days may be required. Said work may be commuted by paying the tax-collector \$2 before being assigned to work or \$2.50 after assignment (Code 1906, ch. 123, sec. 4416-42).

Benefit Assessments.—The owners of one-half or more of land bordering on any section of road may petition the board of county commissioners for a survey and estimate of the improvements of such road, and afterwards upon written request of the owners of three-fifths of such land as will be benefited by such improvements, that all lands so benefited be assessed in proportion to the benefits conferred to the extent of one-third of the cost of constructing such road, the board may levy and collect a special tax on such lands sufficient to pay one-third of such cost, and such lands shall be known as the "benefit district" of such section of road. No benefit assessment shall be made on any land more than $3\frac{1}{2}$ miles from the road (L. 1902, p. 145).

The county board of supervisors may regulate the loads that may be hauled over bridges and highways where they are liable to injure the same and may authorize land-owners to erect gates across roads. Overseers shall erect mile-posts and guide-boards along the public highways in their respective districts. The speed over bridges is limited to a walk.

The board of supervisors may establish and license a toll-bridge, turnpike, causeway, or plank road over any part of the public highways and shall fix and regulate the tolls on same (Code 1906, ch. 123).

The leasing of convicts is abolished and the board of supervisors is authorized to work them on county farms or on the

public roads or other public works or to keep them in jail. This applies to municipalities also. Sexes and races are to be separated and work separately. No convict shall be let to contractors (Acts 1908, ch. 109).

The superintendent of the penitentiary is authorized to improve and maintain not to exceed two roads from each convict farm in the state for a distance of 5 miles, out from said farms, with the convict laborers located and domiciled on said farms. The said superintendent shall be amenable to the board of supervisors in the performance of this duty (L. 1910, ch. 167).

Municipalities May Maintain Roads.—The mayor and board of aldermen or municipal authorities of any city, town or village may, if they deem it necessary or to the interest of such city, town or village, make contract in the name of such city, town, or village with the board of supervisors of the county in which the same is located for working and keeping in repair the public roads leading into such city, town or village, so far therefrom as the authorities see proper. When such contract is let and approved by the board of supervisors it shall be executed under supervision of the mayor and board of aldermen (L. 1910, ch. 168).

Bond Issues.—For the purpose of providing the county with a courthouse, jail, poor-house and for building bridges and constructing public roads and for refunding any outstanding bonded indebtedness of the county the board of supervisors may issue the bonds of the county to an amount not to exceed, including all of its bonded indebtedness, 5 per cent on the assessed value of all the taxable property in the county. Said bonds to run not exceeding 40 years and bear 6 per cent interest. In the event bonds are so issued said board of supervisors shall annually levy a tax sufficient to pay the interest of said bonds and create a sinking fund for their redemption.²⁰

MISSOURI

State Highway Officials.—An act approved March 19, 1907, provides for a State highway engineer who shall be a competent civil engineer with a knowledge of road building. He is appointed by the State Board of Agriculture for a term of four years and receives a salary of \$2400 per annum and actual traveling expenses. Deputy highway engineers may be appointed when needed and their salaries fixed by the State board of agriculture. The State highway engineer and his deputies are subject to the instructions of the State board of agriculture.

²⁰ Digest revised and approved by Hon. Ross A. Collins, attorney general of Mississippi, March 1, 1912.

Duties of State Highway Officials.—The State highway engineer is authorized to investigate road conditions and materials throughout the State, devise plans and methods of building roads and bridges and to give advice, specifications, and estimates to local road officials. The information secured by him and his assistants is to be compiled and published by the State board of agriculture. Improvements to be paid for in part from the "general State road fund" shall be submitted to the State highway engineer for approval when the cost of such improvement is not less than \$1000 per mile of road or not less than \$500 per bridge in the aggregate.

State Highway Funds and their Distribution.—There is established in connection with the State treasury a fund known as the "general State road fund" which shall be used for no other purpose than for the permanent improvement of the highways within the State which improvement is specified to be the surfacing of any road with gravel or rock or with a well constructed mixture of sand, clay, gravel, and rock, and any heavy grading of the road, and the construction of concrete or masonry culverts. Plans for such improvement are to be approved by the county court and where the cost is not less than \$1000 per mile of road or not less than \$500 per bridge to be submitted to the State highway engineer for his approval.

This road fund shall be apportioned to the several counties and the city of St. Louis when such counties and city provide the funds necessary for meeting at least one-half of the cost for such construction or improvements. Whenever one-half of the necessary funds have been raised the county court, or properly constituted authorities of the district, or the municipal assembly of the city of St. Louis shall make requisition for their proportionate share of the general State road fund each year. The apportionment shall be according to the assessed valuation of property, but no county, district, or city shall be entitled to receive in any one year more than 3 per cent of the total amount belonging to said fund for said year. The requisitions of the several counties and districts and city of St. Louis shall be made on the State auditor on or before July 1, each year, and the part of the fund not applied for shall after two years revert to the State road fund and be subject to future apportionment. No part of this fund shall be used for the purchase of rights of way.

An act approved March 8, 1907, called the "stamp act," provides that a complete record be made of every sale of stock or bonds of any corporation, on margins or otherwise, and that the seller be required to place a stamp provided by the State auditor valued at twenty-five cents on each transaction. All money derived from their sale is set apart for road purposes and distributed

among the counties in the same proportion as the school funds. This act has been fought in the courts up to the United States supreme court and recently adjudged to be constitutional. The estimated income from this source is \$100,000 annually.

On March 30, 1907, an act as approved amended the law relating to taxes on dram shops. The amended law provides that a tax of not less than \$100 nor more than \$200 be levied on dram shops for state purposes, and not less than \$250 nor more than \$400 for county purposes, the amount to be fixed by the county court levying the tax. The county court may use two-thirds of the county tax for road purposes and expend the same in the various districts in proportion to road mileage or it may expend all the money in one or more districts. In counties with a population of more than 150,000 and less than 400,000 inhabitants as much of this fund as may be necessary shall be used for the maintenance of macadam roads.

An appropriation of \$12,000 was made in 1907 to pay the salary and expenses of the State highway engineer and his assistant for the biennial period and again in 1909 and 1911.

An appropriation of \$75,000 in 1909 and \$101,000 in 1911 was made to be applied to the credit of the general State roads fund and apportioned among the several counties and districts having unpaid requisitions correctly made under the act for State aid governing the general State road fund.

The legislature of 1911 repealed the State automobile law and enacted another in lieu thereof which provides for an annual license of automobiles and automobile drivers, that for the cars being graduated in proportion to the horse power, and placed the enforcement of the act and collection of licenses under the secretary of state. The revenue from this act will be about \$100,000 annually and shall be paid into the general State road fund.

County and Local Road Administration.—County government is under two separate systems of organization termed the regular and the township organization. The two forms are similar in so far as concerns the election of a county board of three members termed the county court, and the members thereof, the county judges. Two members, called the associate judges, are elected every two years and a presiding judge every four years. This court annually appoints a county highway engineer, as the county superintendent of roads, and fixes a salary between \$300 and \$2000 per year. The county courts under both systems control the opening of new roads, closing old ones and changing the rights of way.

In the regular counties, of which there are ninety-two, the county courts have full charge and control of road affairs. They divide the county into road districts and appoint the overseers of the

districts; fix the amount of road tax and make the road levies; proportion the amount due each district under the law; draw the warrants for payment of all road funds and build all bridges and culverts costing more than \$50 per structure.

In the township counties, of which there are 22, the county courts build all bridges and culverts costing more than \$100. The road affairs of each township in these counties are governed by a board of three members elected every two years. The board of township commissioners divide the township into road districts and appoint the overseers; fix the amount in one form of levy and make all the road levies for the township and pay out the road funds by warrants. The county engineer has no authority over the township boards in these counties, over the district overseers nor road expenditures unless where the county court has jurisdiction in rights of way and bridges and culverts costing more than \$100.

Local Road Funds.—There are three forms of local road levies. A poll tax which the legislature of 1911 made payable in cash only. All able-bodied male inhabitants between the ages of twenty-one and fifty years living outside of incorporated limits a cash tax of \$2, and all other male inhabitants outside of incorporated limits 50 cents.

The amount of taxes for all county purposes is limited by the State constitution between 40 and 50 cents on the \$100 of assessed valuation, depending upon the valuation of the county. These assessed valuations are fixed by the county authorities and range all the way from one-fourth to one-half of the full value. Out of this constitutional tax rate of 40 to 50 cents the county courts may use not to exceed 20 cents on the \$100 assessed valuation for road purposes provided that the amount levied for road purposes shall be levied only on property outside of incorporated limits. This levy is returnable to and constitutes the road district funds of the several districts. It is levied by the county courts in all counties and is collected by the county officials in the regular counties and the township officials in the township counties. One-fifth of it must be returned by the townships in the township counties which makes the county bridge fund in those counties.

In addition to this the constitutional amendment of 1908 provides for an additional road levy of 25 cents on the \$100 assessed valuation, to be used for roads and bridges and for no other purpose whatever. It is applied upon all taxable property, both within or without incorporated limits, and is a county road and bridge fund in the regular counties and a township road fund in the township counties. It is levied by the county courts in the regular counties and is left to the option of the court to apply any or all of it; and in a similar manner by the township boards in the township organized counties.

Special Districts.—Besides the two forms of county organization Missouri laws provide for two forms of special road districts both of which have been adjudged unconstitutional in township organized counties. There are now 120 of these special districts in the 92 regular counties. One form of these districts shall not exceed 64 square miles in area, must include an incorporated city, town or village and may issue road bonds not to exceed 5 per cent of the assessed valuation of the district. The other special district is a strip of territory along a road organized for purposes of improving and maintaining the road and an acreage tax of any amount can be voted upon the lands within the district. Each special district is governed by three commissioners and the county court and engineer have no jurisdiction except upon rights of way questions and bridges costing more than \$100. The regular poll tax rates and the property road tax levies applied in the county by the county court must prevail within the special districts, but all road moneys, one-half the county saloon revenue and one-fourth the city saloon revenue paid within the district must be set aside and returned to the district for road purposes.

Road Bonds.—The counties of the State of Missouri, the special road districts or the township may issue road bonds by a two-thirds vote in an amount not to exceed 5 per cent of the assessed valuation and for a period of fifteen years.²¹

MONTANA

Constitutional.—The rate of taxation on real and personal property for State purposes, except as hereinafter provided, shall never exceed $2\frac{1}{2}$ mills on each dollar of valuation; and whenever the taxable property of the State shall amount to \$600,000,000 the rate shall never exceed 2 mills on each dollar of valuation, unless the proposition to increase such rate, specifying the rate proposed and the time during which the rate shall be levied shall have been submitted to the people at the general election and shall have received a majority of all votes cast for and against it at such election (Session Laws, 1909, ch. 4, sec. 9).

The legislature shall not, in any manner, create any debt or liability which shall exceed, in the aggregate, the sum of \$100,000, except in case of war, unless the law authorizing the same shall have received a majority of vote of the people at a general election of the State (Con., art. 13, sec. 2).

No county shall become indebted, in the aggregate, exceeding 5 per cent of the taxable valuation of all property therein. No

²¹ Digest revised and approved by Mr. Curtis Hill, State highway engineer, January 2, 1912.

county shall incur any indebtedness or liability for any single purpose to an amount exceeding \$10,000, without the approval of a majority of the electors thereof voting at an election to be provided by law (art. 13, sec. 5).

A city, town, township or school district can not become indebted in any amount exceeding 3 per cent of the value of the taxable property therein, except that the legislature may authorize municipal corporations to submit the question to the taxpayers affected, to construct a sewerage system (art. 13, sec. 6).

It is unlawful for convicts confined in penitentiaries or reformatory institutes to be let to contract to any person or persons or to corporations (Con., art. 18, sec. 2).

Statutory.—The board of county commissioners of the several counties have general supervision over the highways in their respective counties. The said board of county commissioners must divide their respective counties into suitable road districts and appoint a road supervisor for each district, for a term of one year. Each supervisor must be an elector of the county and a resident of the district and must qualify by taking the oath of office. Each road supervisor shall have charge of the highways in his district and keep the same in good repair.

In their discretion the boards of county commissioners may let out by contract the construction, maintenance and improvement of the highways, including bridges, when the cost exceeds \$200, may cause guide boards to be erected, shall have discretionary power to do whatever is necessary for the best interest of the roads and road districts in their counties and the road supervisors are under their control in all things (L. 1903, ch. 44, art. 2, secs. 8, 9 and 10, art. 3, sec. 17018).

The board of county commissioners may, by order, direct the county surveyor, or any member of said board or both the county surveyor and any member of said board to inspect the condition of any highway or bridge in the county and the work done thereon before payment therefor. Such member of said board shall receive, for making said inspection, \$5 per day. The county surveyor shall receive for such said inspection and for all other work performed for the county \$7 per day and actual traveling expenses (L. 1903, ch. 44 sec. 51-53, acts 1905, ch. 76).

The resident owners of real estate within two miles on either side and one mile beyond the terminus of any main highway in the county, which it is desired to have improved, shall present to the board of commissioners of their county or counties a petition signed by a majority of such resident land owners. The county commissioners shall then inspect said highway, and shall approve or disapprove the same, and, if they shall approve, shall adopt a resolution to that effect and the county surveyor shall prepare

plans and specifications for the improvement of said road. The contract for the construction, thereof, shall be let, by the board of county commissioners, to the lowest responsible bidder, after due notice and advertisement. Twenty-five per cent of the contract price of such work shall be retained until the entire work has been completed and accepted. The county surveyor shall have entire supervision of the work and shall report to the board of county commissioners, and if there is no county surveyor then the said board shall appoint a competent person to so supervise the work. In the payment for the cost of such improvement, the county shall pay 65 per cent and the residents living adjacent to such highway shall pay the remaining 35 per cent of the cost thereof, in proportion to the benefits accruing thereto (L. 1909, ch. 143).

Road Taxes.—There must be levied and collected on the taxable property in the county, for road purposes, not less than 1 nor more than 3 mills on the dollar. Also a special road poll tax of \$2 on every man, over twenty-one and under fifty years of age residing in the county, is levied, to be collected by the road supervisor in cash, or to be paid by the performance of one day's work upon public highways. This section does not apply to incorporated cities or towns which levy and collect this amount for road, street and alley purposes, but if they do not so levy and collect this amount it shall apply to them also. All money collected under the above levy shall belong to the general road fund of the county (sec. 1344, Rev. Code, 1907).

The fund arising from the forest reserves of any State shall be paid to the State by the secretary of the treasury of the United States, in pursuance of a clause in the agricultural appropriation bill of 1906, which provides that 10 per cent of all moneys thereafter received from each forest reserve shall be turned over to the State in which the same is collected to be distributed among the counties and expended, one-half for the improvement and maintenance of roads and the other one-half for school purposes (Acts 1907, ch. 127).

Bond Issues.—The board of county commissioners is authorized to issue coupon bonds sufficient to provide funds for building sites or constructing necessary public buildings and for the construction of bridges and highways (Acts 1905, ch. 40).

Width of Highways.—The width of all highways, except bridges, alleys and lanes, must be 60 feet, unless a greater or less width is ordered by the board on petitions of the persons interested. The width of all private highways and by-roads, except bridges, must be at least 20 feet (Acts 1903, ch. 44, art. 1, sec. 3).

All public bridges are maintained by the county at large, under the management and control of the board of county commissioners. Said board may levy a special tax, not to exceed 1

mill on the dollar of taxable property in the county, for the purpose of constructing, maintaining and repairing free public bridges (Acts 1903, ch. 44, art. 10, sec. 75-76).²²

NEBRASKA

Unit of Administration.—The county board of commissioners have general supervision over the public highways of the counties where the township organization does not exist and shall divide the county into as many road districts as may be necessary, provided that in no case shall any road district be so constituted as to be within the limits of two distinct voting precincts, or townships in counties under township organization. A road overseer is elected at each general election for each road district (Cobbey's *Annotated Statutes of 1911*, sec. 6099).

Provision of law exists whereby the county board of each county may appoint a county highway commissioner. Such county highway commissioner shall be a practical and experienced road builder and the county board may designate and appoint the county surveyor or any other person deemed qualified for the office, provided that in counties having 50,000 population or over the county surveyor shall perform all the duties and possess all the powers and functions of the said office of county highway commissioner. Said county highway commissioner, in the event the county board shall appoint such an officer, and the county board, shall have exclusive control and supervision of all the public roads of the county, in accordance with the provisions of this act. The district road overseer shall work under the direction of the county highway commissioner, where such commissioner is appointed. The county highway commissioner shall be the superintendent of the construction of all roads and bridges and their maintenance, and shall make plans and specifications when requested by the county board for such improvements. He shall make, prior to the first day of January of each year, a complete and full written report to the county board of all work performed in improving and maintaining public roads in the county, showing the funds expended therefor. The road overseer of each district shall at least 3 weeks prior to the first day of the year in like manner report to the county highway commissioner. It shall be the duty of the county highway commissioner to have all main traveled earth roads in the county dragged regularly at such times as he may deem most beneficial and make contract therefor, with the consent and approval of the county board,

²² Digest revised and approved by Hon. Albert J. Galen, attorney general, February 13, 1912.

giving preference of such contracts to the adjoining or adjacent land owners or tenants, for a piece or portion of such road to be dragged, to cost not to exceed \$1 per mile for each dragging, for a width not less than 16 feet. The compensation allowed to such county highway commissioner ranges from \$5 per day and traveling expenses in counties of less than 8,000 population to \$1500 per year and traveling expenses in counties having a population of 20,000 and less than 50,000, and where the county surveyor performs the duty of county highway commissioner in counties of more than 50,000 population no additional salary shall be received by him, except his actual expenses when officially engaged. (The adoption of this law is optional with the county board). (Cobbey's *Annotated Statutes of 1911*, sec. 6191).

In counties having adopted township organization the county commissioners thereof shall divide such counties into seven districts, each to be known as supervisor districts. Such districts shall be divided as near as possible with regular boundary lines and shall, as near as possible, have the same number of inhabitants, but no township shall be divided in the formation of any such district. In counties having cities of over 1000 inhabitants, where such cities have more inhabitants than the average outlying districts, the county board shall add enough contiguous territory to such city to form two supervisor districts and shall segregate them with as nearly as possible equal population and the balance of the county outside of such city districts shall be so divided as to create seven supervisor districts, including such city supervisor districts. A supervisor shall be elected by vote of the people for each such district (Cobbey's *Annotated Statutes of 1911*, sec. 4525).

In counties under the township organization control over the roads vests in the town boards, subject to general supervision of the county commissioners or board of supervisors. Each town is divided into road districts and an overseer appointed for each district.

All public streets of villages not incorporated are a part of the public roads and all road overseers or persons having charge of the same in the respective districts of such villages shall work the same as provided by law (Cobbey's *Annotated Statutes of 1911*, sec. 6084).

Taxation.—In counties under township organization the township road tax and the county road tax shall be paid in cash. All moneys paid into the town treasury from the several road districts in discharge of property or labor road tax shall constitute a town road fund, which shall be at the disposal of the town board for the benefit of the road districts. One-half of all moneys so paid into the town treasury from the several road districts shall

constitute a district fund, which shall be expended by the town board in the road district from which it was collected, for the construction and repair of bridges and culverts, making fire guards along the line of roads, for the payment of the wages of the overseer, for the necessary tools and for work and repairs on the roads (Cobbey's *Annotated Statutes of 1911*, sec. 6150).

All road and labor taxes shall be paid in cash. One-half of all moneys collected as road tax shall constitute a county road fund, which shall be divided equally among the several commissioner districts for the general benefit of the roads therein; the other one-half of all labor and road taxes collected shall constitute a district road fund and shall be expended under the direction of the road overseer in the road district from which collected. The board may levy the same rate of road tax upon property within cities of the metropolitan class, cities of the first and second class and villages as is levied upon property of the several road districts, and one-half of all such tax, when collected, shall go to the county road fund; the other one-half to be paid to the city or village where collected (Cobbey's *Annotated Statutes of 1911*, sec. 6122).

On petition of a majority of the resident free-holders of any road district, precinct or township, to the county board asking that a levy of not less than 5 nor more than 25 mills be assessed on the taxable property therein, it shall be the duty of the said county board to make the levy as requested, the proceeds of which shall become a part of the district road fund of the said district, precinct or township and shall be used exclusively in improving the highways therein. Said levy may be continued each year, as often as requested, by the said majority of free-holders (Cobbey's *Annotated Statutes of 1911*, sec. 6188).

The county board of any county in which any city of the metropolitan, or city of the first class, having over 25,000 inhabitants, is situated, may, whenever the road fund of said county will warrant, aid in grading, paving or otherwise improving any street, avenue or boulevard leading into said city and within the corporate limits thereof, by providing for payment of not exceeding one-half of the cost thereof; and to so aid in the improvement of any such street, avenue, boulevard or road leading into and adjacent to such city, outside the corporate limits thereof and within two miles of the corporate limits including any portion thereof leading into or through any village or town (Cobbey's *Annotated Statutes of 1911*, sec. 6051).

Contracts.—The erection or repair of all bridges and approaches, where the cost will exceed \$100, must be let to contract by the county commissioners or the board of supervisors (Cobbey's *Annotated Statutes of 1911*, sec. 6126).

When it is necessary to build or repair any bridge or road in any town, the cost of which would be more than could be raised in one year by ordinary road taxes in such town, the town board may petition the county board for aid in defraying the cost of such work and the said county board may do so, said appropriation to be expended under the supervision of the agent or agents of the county and the contract shall be let by the town board, in accordance with the provisions of law for letting such contracts (Cobbey's *Annotated Statutes of 1911*, sec. 6154).

Bridges.—In counties under township organization the expenses of building, maintenance and repair of bridges on the public roads over streams shall be borne exclusively by the county within which such bridges are located and the county board of every such county shall make permanent and adequate provision for the payment of the expenses thereof (Cobbey's *Annotated Statutes of 1911*, secs. 6192, 6193).

Bond Issues.—Any county, township, precinct, city or village in the State may issue bonds to construct or aid in the construction of a highway wagon bridge across any boundary river of the State, if three-fifths of the voters shall so determine at an election held for that purpose. Said bond shall not exceed 10 per cent of the assessed valuation in such county, township, precinct or village (Cobbey's *Annotated Statutes of 1911*, sec. 6210).

Split-log Drag.—Road overseers are authorized to maintain roads by the use of "King Road Drag" such work to be done by contract or otherwise; rural mail routes to be given preference in such work (Cobbey's *Annotated Statutes of 1911*, secs. 6255, 6256).

Special Bridge Fund.—The board of county commissioners or board of supervisors in counties under township organization may levy annually a tax of not to exceed one mill upon the dollar valuation of property within said county as a special emergency bridge levy. Said special emergency bridge fund shall be at the disposal of the county commissioners, or the board of supervisors in counties under township organization, for use in the construction or repair of bridges whenever an emergency warrants the same (Cobbey's *Annotated Statutes of 1911*, secs. 6213x1, 6213x2).

Inheritance Tax.—An inheritance tax is provided on all gift legacies and inheritances in certain cases and the proceeds expended under the county board for the purpose of permanent highway improvements throughout the different counties (Cobbey's *Annotated Statutes of 1911*, sec. 11218).

Fund from Forest Reserves.—The forest reserve fund, created by act of congress, 1906, provides that 10 per cent of all money thereafter received from each forest reserve be turned over to the State in which located, to be expended for schools and roads, is

to be apportioned among the counties in proportion to the area of forest reserves contained therein respectively (Cobbey's *Annotated Statutes of 1911*, sec. 11712).

State Aid for Bridges.—The State board of irrigation is hereby constituted and declared to be the State board of supervision for bridges, to be located and constructed under this act, and the State engineer, acting under the said board, is empowered to carry out the orders thereof. The county board or boards of any county or counties may make application in writing to the State board of irrigation for State aid in the construction of any bridge across any stream, of the width of 175 feet or more, under the jurisdiction of the said county board or boards. Said application shall contain a description of the proposed bridge, with the preliminary estimate of cost, and a certified copy of the resolution of said board or boards, pledging said county or counties to furnish one-half of the cost of construction of said bridge. All work done under the provisions of this act shall be by contract let by the said county board or boards and the State board of irrigation jointly to the lowest and best bidder. Plans and specifications are to be furnished by the State engineer and the construction shall be under joint supervision of the State board of irrigation and the said county board or boards and must be accepted by them before final payment therefor. After completion of such bridges and the acceptance thereof by the State board of irrigation, the county or counties having jurisdiction thereof shall bear the cost of maintenance of same where it does not exceed \$100 per year, and in case it exceeds \$100 per year then such cost shall be borne equally by the State and county or counties. There shall be a levy on each dollar of assessed valuation of property in the State of one-fifth of 1 mill per annum, which shall be made by the State board of equalization in the year 1911 and each year thereafter. The proceeds of such levy shall constitute the "State-aid bridge fund", which shall be used exclusively for the purpose herein provided (Cobbey's *Annotated Statutes of 1911*, secs. 6145x1–6145x8).

Motor Vehicles.—A registration fee of \$1 for each motorcycle and \$2 for each motor vehicle, other than motorcycles, is required of the owner of each such vehicle within the State (Cobbey's *Annotated Statutes of 1911*, sec. 6230). Each manufacturer of or dealer in motor vehicles may register one vehicle of each class manufactured or dealt in by him (Cobbey's *Annotated Statutes of 1911*, sec. 6232). It is unlawful for any person under 16 years of age, or for any intoxicated person, to operate a motor vehicle (Cobbey's *Annotated Statutes of 1911*, sec. 6234).

No person shall operate a motor vehicle on any highways outside a city or village at a greater speed than is reasonable and

proper, having regard for the traffic and the uses and condition of the road; nor in any case at a rate of speed exceeding 25 miles per hour (Cobbey's *Annotated Statutes of 1911*, sec. 6235). Penalties are provided for violations of any of the foregoing provisions. (Cobbey's *Annotated Statutes of 1911*, sec. 6238.) Nothing herein contained shall be construed as limiting the power of local authorities to make and enforce any ordinance, rule or regulation of motor vehicles in addition hereto (Cobbey's *Annotated Statutes of 1911*, sec. 6239).

The provisions of this act, so far as they relate to registration and fees, shall not apply to motor vehicles owned and operated, for a period not exceeding thirty days at a time, by non-residents of the State who have complied with the registration laws of their own State, territory or district (Cobbey's *Annotated Statutes of 1911*, sec. 6240). All registration fees provided for in this act shall be paid to the treasurer of the county in which the applicant resides and shall be credited to the county road fund for the construction and maintenance of permanent roads (Cobbey's *Annotated Statutes of 1911*, sec. 6231). Application for the registration of motor vehicles must be made to the secretary of State (Cobbey's *Annotated Statutes of 1911*, sec. 6230).²³

NEVADA

Constitutional.—For the purpose of enabling the State to transact its business on a cash basis the State may contract public debts, but such debts can never in the aggregate, exclusive of interest, exceed the sum of \$300,000, except for defraying extraordinary expenses (Con., art. 9, sec. 3.)

Administration.—The roads in each county are under the control and management of the board of county commissioners. All public roads and the streets and alleys in incorporated cities and towns in the State, now used or lawfully entitled to be used as such and all such roads as the board of county commissioners shall hereafter lawfully cause to be opened, are public highways (Comp. L. 1861-1900, sec. 447).

The office of road inspector is created and the county commissioners in each county may appoint one road inspector for each district, to hold office at the will of said board. His duty shall be to superintend, inspect and approve, if properly done, all work upon the public roads of his district, including that to be done by supervisors, if any, and report thereon to the board of county commissioners. He must serve without compensation unless

²³ Digest examined and approved by Hon. Grant F. Martin, attorney general of Nebraska, February 1, 1912.

there be especial prescribed limit of compensation for said office in such road district (approved February 27, 1897; Comp. L. 1861-1900, sec. 468-70.)

The county commissioners of each county in the State, polling at the last general election 3000 votes or over, shall for the purpose of supervision of roads divide the county into road districts, each appropriately designated. The board of county commissioners of said county shall, at its first regular meeting in January, 1913, appoint and fix the compensation of one road supervisor in each such road district, to serve during the pleasure of the said board.

It shall be the duty of such road supervisor to supervise all work upon the roads in his district, to attest the correctness of all bills for such work and to direct expenditures of all sums set apart in his district by the said board of county commissioners. Each road supervisor shall take the oath of office prescribed by law and execute bonds to the State to be approved by the board of county commissioners, in the penal sum of \$100. This act shall take effect on the first day of January, 1913 (L. 1911, ch. 172).

Road Taxes.—All moneys received from poll tax collected by the county commissioners of the various counties in the State shall be set aside by the county commissioners for the use of the different road districts in the respective counties, according to the amounts collected in each such district (L. 1911, ch. 192).

The board of county commissioners may levy a tax not exceeding one-fourth of 1 per cent on the taxable property of the county, the proceeds of which must be paid into the road fund. Also when a majority of the property-holders of any road district shall petition the county road commissioners for a road tax for any such district, they may levy a tax upon all the property within the district, not exceeding \$3 on each \$100 valuation, provided that the last named tax may be paid in whole or in part by labor on the roads of the district at the rate of \$3 for each full day's work and implements of labor, and \$4 per day for each team of two animals and \$1 for each additional animal (approved March 15, 1875, no. 159, Comp. L. 1869-1900, sec. 478.)

Contracts.—All work done upon highways, streets or alleys, in opening, improving or keeping the same in repair, shall, when the probable cost exceeds \$500, be done by contract let to the lowest responsible bidder (L. 1911, ch. 175).

When the cost of construction and repair of any bridge will not exceed \$500, the board of county commissioners shall let same to contract without advertising for bids, but in case such cost will exceed \$500 the contract shall be let to the lowest responsible bidder after advertisement by the board of county commissioners (L. 1911, ch. 186).

Toll Roads.—Any person or persons desiring to construct and maintain a toll road or bridge within a county may do so after making proper application therefor to the proper county officials, and provided that after five years' time the county or counties shall have the right to purchase same at an appraised valuation. The rates of toll shall be subject to regulation by the board of county commissioners (Comp. L. 1861-1900, sec. 453-460).

Width of Roads.—The width of all public highways must be regulated and established by the board of county commissioners, but shall not exceed 60 feet (Comp. L. 1861-1900, sec. 480).

Guide Boards.—It is the duty of the board of county commissioners to cause to be erected at each crossing of all public roads a sign or guide board. It is the duty of the owner or owners of toll roads to erect proper sign and guide boards along their roads. (Comp. L. 1861-1900, sec. 440-41).

Convict Labor.—Twenty thousand dollars is appropriated from the State treasury to constitute a general road fund. The board of State prison commissioners is authorized to detail for work on the public highways of the State any male convict in the State prison, who on the recommendation of the warden and in the opinion of the said board may be properly so detailed, excepting prisoners under sentence of death, provided that such detail shall be voluntary upon the part of the convict and shall not be caused by any form of compulsion.

Convicts while working on the roads shall be under the general direction of the warden and guards appointed by him. They shall not be required to wear stripes, and for infraction of rules the maximum punishment of any convict shall be his summary return to the penitentiary and forfeiture of credits. In addition to the time off for good behavior, now allowed by law, convicts so detailed to work on the public roads shall be allowed ten days off for each month's faithful work and compliance with such rules and regulations, and in addition thereto each such convict shall be allowed the sum of 25 cents for each day's labor, which shall accumulate and be paid on the termination of sentence or on his release by pardon or parole and which shall be in addition to the sum ordinarily given such convicts; Provided that on petition of any such convict said board of State prison commissioners, in its discretion, may pay out from any sum so to the credit of any convict any portion or all thereof in support of the dependent wife, child or parent, of any convict, in distress.

Said board, on the recommendation of the State engineer or the county surveyor of each county, shall determine upon what public roads convicts so detailed shall be employed and shall pass upon and approve or reject the plans and specifications of the State engineer or the respective county surveyors in respect thereto.

The State engineer shall have general supervision and direction of all road work so approved. No road work, under the provisions of this act, shall be undertaken without an agreement with the county commissioners of such counties with respect to the surveys, etc., and that such counties will, at their own expense construct all necessary bridges, and such counties may be required by said board to contribute in part toward the expenses of the maintenance of convicts on such road work (L. 1911, ch. 71).²⁴

NEW HAMPSHIRE

State Highway Department.—The governor and council are authorized to appoint, and fix the compensation of, a State engineer, and such other officers and employees as may be necessary, and to provide offices in the city of Concord. The governor and council shall make bi-ennial report to the general court, showing all expenditures, and containing information and recommendations.

The governor and council shall act upon all applications for State aid, and shall apportion the aid among the various counties, cities and towns, making such application.

All State aid road work shall be under plans and specifications provided by the governor and council, and where the amount of such improvement exceeds \$1000 shall be let by contract to the lowest bidder. If, however, any town, city or unincorporated town shall desire to execute such work, having proper machinery and facilities therefor, the governor and council may permit them to do so. If no acceptable bid is received, the State highway engineer shall so certify to the governor and council, who may, with the approval of the proper local authorities, employ agents to perform such work upon terms satisfactory to the governor and council, and the highway authorities of such city or town.

State Highways.—All State highways shall be constructed and maintained under the direction of the governor and council, or someone appointed by them, at the expense of the State. The said governor and council shall cause surveys to be made of all such State highways, and deposited with the secretary of State.

The governor and council shall designate for improvement three continuous highways, from the Massachusetts line northerly. The first shall extend from the Massachusetts State line at Seabrook to and through Pinkham Notch, thence through Dixville Notch to Colebrook, and shall be known as the Eastside Road. The second shall extend from said State line at Nashua over the road designated by the governor and council, continuing to the town

²⁴ Digest revised and approved April 22, 1912, by Hon. C. H. Baker, Attorney General.

boundary between the towns of Woodstock and Lincoln, and shall be known as the Merrimac Valley Road. The third shall extend from the said State line at a point to be determined by the governor and council along the Connecticut and Ammonoosuc Valleys to the terminus of the Eastside Road at Colebrook, and shall be known as the Westside Road. The routes of such highways may be changed by the governor and council to such an extent as they may deem necessary to the best interests of the public.

The governor and council may, upon the application of any town or unincorporated town or place, furnish free of charge, an engineer in the employ of the State, for consultation and advice as to road improvement.

Road Revenues and State Aid.—Each town shall, out of the money raised and appropriated for the repair of its highways, set apart the following amounts for the improvement of its highways, under the supervision of the State engineer.

Towns having a valuation of less than \$2,000,000, \$1 on each \$1000 of such valuation.

Towns of \$2,000,000 and less than \$3,000,000 valuation, 75 cents on each \$1000 of such valuation.

Towns of \$3,000,000 and less than \$5,000,000 valuation, 50 cents on each \$1000 valuation.

Towns of \$5,000,000 and less than \$15,000,000 valuation, 33½ cents on each \$1000 valuation.

Towns of \$50,000,000 and upwards valuation, 25 cents on each \$1000 valuation.

Counties within which are located unincorporated towns, \$1 on each \$1000 of the valuation of each of such unincorporated towns in which there are highways,

If any city, town or unincorporated town desires State aid, for the permanent improvement of its highways, in addition to the improvements provided for by the foregoing amount, they shall raise and set apart an additional sum equal to 50 per cent of the amount required to be raised and set apart for permanent improvements, as above, and such additional sum, so raised and appropriated, shall be set apart for the maintenance of highways. They may then make application for State aid, and shall certify that said additional sum has been raised and set apart. Such application must be made on or before the first day of May of such year.

The governor and council shall apportion, from the amount appropriated under the provisions of this act to each city, town or unincorporated town which has raised, such additional amount, for each \$1 so raised and set apart, the following amounts:

Towns, unincorporated towns, and places, having a valuation of less than \$100,000, \$3 for each \$1 so set apart. Towns, and

unincorporated towns, and places having a valuation of \$100,000 and less than \$250,000, \$1.25; towns, and unincorporated towns and places having a valuation of \$250,000 and less than \$500,000, 60 cents; towns having a valuation of \$500,000 and less than \$1,000,000, 40 cents; cities and towns having a valuation of \$1,000,000 and less than \$3,000,000, 25 cents; and cities or towns having a valuation of \$3,000,000 and upwards, 20 cents.

The amount so set aside by such city or town which has applied for State aid, and the amount apportioned by the governor and council, shall constitute a joint fund for the permanent improvement of such highway or highways within such city or town as the governor and council, and the local authorities having jurisdiction over highway expenditures, may designate for permanent improvement, provided that no part of such joint fund shall be expended on any highway within the compact portion of any city, town, or village, such compact portion to be determined by the governor and council, except in towns of less than 2500 population. Such cities, towns and unincorporated towns and places as do not apply for State aid, may, as herein provided, expend the money first set apart, hereunder, for the permanent improvement of such highways as the local authorities may select.

Any part of said joint fund not expended during the year for which it is set apart and apportioned, may be expended during any succeeding year.

State Bonds.—The treasurer of the State, under the direction of the governor and council, is authorized to issue not to exceed \$1,000,000 in State bonds, bearing not to exceed $3\frac{1}{2}$ per cent, payable semi-annually, in such sums, and for such length of time, not exceeding thirty years, as the governor and council may determine. Such bonds shall be called the highway bonds, and shall not be sold for less than par. The amount so issued shall not exceed, in any one year, one-fourth the total amount authorized. The proceeds of said bonds shall be held by the treasurer, and paid upon warrants drawn by the governor, for the purposes of this act, but shall not be used for the maintenance of highways, or for any other purpose than the constructing and improvement of permanent highways, and for carrying out the provisions of this act.

There is annually appropriated \$125,000 for paying the interest and annual installments of the principal of the bonds, and for the permanent improvement of main highways, in accordance with the provisions of this act, and for the maintenance of State highways. Any unexpended balance shall be applied to and made additional to the appropriation for the succeeding year. Upon the sale of such bonds the treasurer shall estimate the amount necessary to be set aside annually to pay the interest and principal

on same. The remainder, after deducting the amount necessary for administration, and road maintenance, shall be available, together with the proceeds from the sale of said bond, for State aid and the construction of State highways.

Maintenance.—The law provides that 65 per cent of the fees and fines collected from the motor vehicle law shall be used for the maintenance of the trunk line roads and 35 per cent to be used for the maintenance of roads not on trunk lines.²⁵

Synopsis of Automobile Law On and After January 1, 1912

Registration.—Annual, with secretary of State, Concord, N. H.

Fees—Residents.—Automobiles owned by residents of New Hampshire: Not exceeding 15 horse-power, \$10; exceeding 15 horse-power and not exceeding 30 horse-power, \$15; exceeding 30 horse-power and not exceeding 40 horse-power, \$20; exceeding 40 horse-power and not exceeding 50 horse-power, \$25; exceeding 50 horse-power and not exceeding 60 horse-power, \$30; exceeding 60 horse-power, \$40.

Between October 1 and December 31 of each year, one-half of the above named fees.

Horse-power to be determined by A. L. A. rating.

Dealer's fee, \$40 per year.

Livery fee, regular registration fee per car.

Commercial vehicle, \$10 per year.

Transfer of registration from registered car to another (same owner), \$2 plus difference in horse-power rating, if any.

Fees—Non-Residents.—For more than a total of ten days in any year (for which time cars registered in the owner's home State are exempt), the same fees as residents except that for registration for July, August and September non-residents pay half rates.

Operators and Chauffeurs.—Private operator, original license, \$3 for calendar year; renewal, \$1 for calendar year. Non-residents, the same—after ten days' exemption in a calendar year for holder of home registration.

No person under sixteen years of age can be licensed as private operator.

Professional chauffeur, original license, \$5 for calendar year; renewal, \$1 for calendar year. Non-residents, the same—after ten days' exemption in a calendar year for holder of home registration.

No person under eighteen years of age can be licensed as a professional chauffeur.

²⁵ Digest revised and approved by H. C. Hill, State engineer, December 27, 1911.

Chauffeurs must wear badges furnished by secretary of State.

Operators and chauffeurs not previously licensed must pass secretary's examination.

Number Plates.—Furnished by secretary of State. Beside registration number and letters "N. H." must bear numerals denoting year of issue. Carried not less than 15 inches nor more than 48 inches above the ground. One pair free with car registration; six pairs free with dealer's registration. Duplicate plates, either style, \$1 each. Special plates for dealers and non-residents.

Motor Cycle. Registration fee, \$3 per year. Must display register number, letters "N. H." and numerals denoting year of registration—numerals to be not less than 2 inches in height. No number plate furnished.

Registration of his motor cycle gives holder right to operate such motor cycle without private operator's license.

Private operator's license gives person, not an owner, right to operate any registered motor cycle.

Brakes, Signalling Devices, Lights, Etc.—Adequate brakes, signalling device, etc., required.

Lamps on front and rear; latter to display red light and make plate numerals visible at least 50 feet. Light of front lamps visible 200 feet. Numbers not required on lamps.

Speed Regulations.—Fifteen miles an hour in thickly settled districts; 25 miles an hour elsewhere, except 10 miles an hour on crossings, curves, etc., or when approaching a vehicle. Stop on signal from persons in charge of horses.

NEW JERSEY

State Highway Officials.—The State highway commission consists of the governor, president of the senate, speaker of the house of assembly, and the commissioner of public roads who serve without compensation other than actual expenses.

The commissioner of public roads is appointed by the governor, and confirmed by the senate, for a period of three years, at \$5,000 per year. His staff are civil service employees who hold office unless removed for cause, and are as follows: One supervisor of public roads, who is commonly known as the chief engineer, at \$3,600 per year. Two assistant supervisors of roads, assistant engineers, at \$1,500 per year.

The commissioner is allowed about \$8,000 per year for clerk hire and the traveling and other necessary expenses of himself and his supervisor, also \$3,000 for the traveling and other necessary expenses of the assistant supervisors.

In addition to the above, the commissioner appoints a local supervisor or inspector for each contract, paying him \$3 per day for each day's actual service.

By special arrangements the bituminous binders and other road materials are tested in the laboratories of the State Geological Survey.

The motor vehicle department is a separate organization attached to the office of secretary of state. The net amount received from licenses, fines, etc. are turned over each month to the commissioner of public roads to be used for the maintenance of public roads.

Duties of State Highway Officials.—The state highway commission is formed for the purpose of bringing about the construction of long through lines of highways. The commissioner of public roads, after conferring with the boards of freeholders and other local authorities, decides upon the roads to be built, improved or maintained with the aid of State moneys. The surveys, including plans, profiles, cross sections, calculations and specifications, must be approved by him before it is lawful for the local authorities to advertise for bids. Later the contracts and bonds are examined and approved by the commissioner before work begins. After the work has been completed to the satisfaction of the local authorities and a statement in writing to the effect, together with a statement of cost, has been submitted by them, the commissioner satisfies himself by personal observation or otherwise that the work is properly done and then accepts it on the part of the State, after which the State's portion, amounting to one-third of the cost is sent to the county.

In general the same is true of the repair work, except that small repairs are sometimes done by day's work and the commissioner uses his judgment as to the proportion of cost that the State pays. The commissioner of public roads has the power to withhold all moneys due the counties from the road work if after sixty days' notice they neglect to repair the State Aid roads.

Duties of Local Authorities.—The laws as originally passed applied only to counties but have since been made to include townships, towns, boroughs, villages, or any municipalities except cities, and officials corresponding very closely to those representing counties take their places. Counties may build and maintain roads entirely at their own expense provided the question is submitted to and approved by a majority of the legal voters at an election held for the choice of members of the General assembly, but in order to secure State aid it is necessary to make application to the commissioner of public roads, and, after receiving the general approval of a certain route, the freeholders instruct the county engineer to make surveys and prepare plans, profiles, cross sections, calculations and specifications which will meet the approval of the commissioner. Advertisements for bids are placed in local and engineering publications for three weeks, after which bids are publicly opened and the lowest bidder who can furnish satis-

factory references and bonds receives the contract, the board of freeholders and commissioner of public roads always reserving the right to reject any or all bids.

It is the duty of the freeholders to maintain all county roads firm, smooth and convenient for travel at all seasons of the year. To this end the board of chosen freeholders are required to appoint a county supervisor of roads, who is paid from the county funds and shall be responsible to the freeholders and the commissioner of public roads for the condition of the roads.

The county engineer is appointed and paid in the same way.

Should the counties desire, and the officials of township, town, borough, or other municipal body petition, any county road passing through its territory may be turned over to that body. Any of the above named bodies may, upon the approval of the commissioner of public roads, acquire by condemnation or otherwise any toll road and receive one-third of the purchase price and one-third of the cost of improvement from the State aid moneys, provided that the States' share in any one year does not exceed \$50,000. Nearly all the toll roads in New Jersey have already been acquired in this way.

It is lawful for counties to raise money for all kinds of road building and repairs by taxation or by bonding.

The expense of all bridge work is borne by the counties, but the State may participate in cost of drainage work.

Abutting Property Owners.—It is the custom in some of the counties to take advantage of the law which requires the abutting property owners or the township to pay 10 per cent of the cost of improvement and in many cases much more than this amount is subscribed by local citizens to induce the early adoption of certain lines.

State Aid Funds, Their Distribution.—The legislature annually appropriates about \$400,000 for what is known as new work or construction to which the State contributes one-third and the county two-thirds of the cost.

Up to October 31, 1911, the amount received from the motor vehicle fund and distributed for repairs was about \$200,000.

The total amount of money spent for construction and repairs of roads by both State and counties exceeds \$2,000,000 exclusive of the amount expended by townships, boroughs and cities.²⁶

²⁶ Digest revised and approved by Col. E. A. Stevens, State highway commissioner, December 27, 1911.

NEW MEXICO

State Highway Officials.—A State good roads commission consisting of the governor, the commissioner of public lands, and the State engineer, all serving without compensation. The governor is ex-officio chairman of the commission and the commissioner of public lands is the secretary.

The State engineer is the active member of the commission and the road construction work is under his immediate direction.

A commission consisting of the president of the New Mexico Historical Society who shall be chairman, the governor of the State, and the mayor of the city of Santa Fe, is created for the purpose of designating and marking by suitable stone monuments the old Santa Fe Trail as it existed within the boundaries of the territory.

Duties of State Highway Officials.—The State roads commission shall meet four times a year on the first Wednesday of January and March, June and September and special meetings at the discretion of the commission. Said commission shall have general charge and supervision of all highways constructed or maintained in whole or part by the aid of State moneys; they may prescribe rules and regulations determining the methods of construction and improvement of highways under their charge. They shall construct and maintain at the expense of the State wholly or in part such public roads as will best serve the interests of the general public. The system of highways previously established by laws in the state and the use of convict labor on such highways shall be under the supervision of the roads commission.

They shall investigate the needs of the various localities in regard to public highways and determine what roads shall be constructed or repaired, and shall coöperate with the board of county commissioners in such work. They may solicit and receive funds and other coöperation from firms, individuals, associations, or corporations.

The roads commission shall on or before January 1, each year make report to the governor of all transactions up to and including November 30 preceding, showing an itemized statement of moneys received and disbursed.

The State engineer is subject to the order of the roads commission and has supervision of the construction, maintenance, and repair of all highways and bridges under this act. No county bridge which exceeds in cost \$1,000 shall be constructed until the State engineer shall have first approved the site for such bridge and the contract and specifications for said bridge.

The commission of which the president of the New Mexico Historical Society is chairman shall designate by suitable stone

monuments the old Santa Fe Trail as it was traveled within the boundaries of the territory over what is known as the "Dry Cimarron Route."

The governor of the State, the mayor of the city of Santa Fe and the president of the New Mexico Historical Society shall have constructed at the southwest corner of the public plaza in the city of Santa Fe a stone arch with suitable inscription marking the same as a principal point on the "Santa Fe Trail".

Duties of Local Officials.—The board of county commissioners of the county through which all proposed roads pass are required to secure the right of way of the same where necessary and to construct the necessary bridges thereon.

Road Revenues and Expenditures.—The roads commission is authorized to cause to be levied annually a tax not to exceed 1 mill upon every dollar of taxable property in the State the proceeds to constitute a "road fund" which shall be subject to the orders of the roads commission. An appropriation of \$1,000 was made for marking the old Santa Fe trail in the manner above described.

Funds may be secured by the roads commission through contributions from private individuals or corporations.

Convict Labor.—The board of penitentiary commissioners shall furnish such number of convicts for road work as may be available upon request from the roads commission, and shall also furnish guards upon request of said commission. The expenses of transporting and maintaining the prisoners while engaged upon road work shall be paid by the roads commission.

Convict labor shall be used in the construction of the arch in the city of Santa Fe in accordance with the plan above described.²⁷

NEW YORK

Classification of Highways.—The highways are divided into four classes: (1) State highways improved at the sole expense of the State; (2) County highways improved at the joint expense of State, county and town; (3) County roads improved and maintained by the county, in such counties as have adopted the county road system; (4) Town highways constructed and maintained by the town with the aid of the State (L. 1910, ch. 566).

State Department of Highways.—The governor, with the consent of the senate, shall appoint a State superintendent of highways, who shall receive an annual salary not to exceed \$8000, and hold office during the pleasure of the governor. The State superintendent

²⁷ Digest revised and approved by Mr. C. D. Miller, State engineer, January 1, 1912.

ent of highways, the State engineer and surveyor, and the superintendent of public works, shall constitute the State commission of highways. The State superintendent, with the consent of the commission, shall appoint two deputies, each of whom shall be a practical road builder. The first deputy shall have charge of the maintenance of the State and county highways, and the second deputy of the improvement and maintenance of town highways and bridges. The commission shall appoint a secretary. The State superintendent of highways shall, with the consent of the commission and subject to civil service regulation, appoint resident engineers, clerks and other employees. Inspectors of construction shall be residents of the county in which the highway to be improved is located.

The commission shall (1) have general supervision of all highways and bridges constructed or maintained, in whole or in part, by the aid of State money; (2) Prescribe rules and regulations fixing duties of division engineers, district, county and town superintendents, in respect to State and county systems; (3) Aid district, county and town superintendents by advice on construction and maintenance of highways and bridges; (4) Cause plans, specifications and estimates to be prepared when requested by district, county or town superintendents; (5) Investigate methods of road construction and maintenance; (6) Compile statistics; (7) Cause public meetings to be held at least once each year, in each district or county; (8) Approve and determine final plans, specifications and estimates for State and county highways upon receipt of report and recommendations of county or district superintendent, and transmit the same in the case of a county highway to the board of supervisors. After approval by the board of supervisors the commission shall cause contract to be let for such improvement; (9) Prepare tables showing total number of miles of highways in State, by towns and counties.

The commission shall divide the State into not more than six divisions, and assign to each a division engineer at a salary of \$3000 per annum. The division engineer shall, under the direction of the commission, make surveys, maps, plans, specifications and estimates for the construction and maintenance of State and county highways, and inspect the work performed on any highways, and report to the commission and the State superintendent of highways, as to whether the work has been done in accordance with specifications and contracts. They shall also provide the monthly estimates for work performed under contracts, and inspect from time to time all State and county highways, and consult with district, county and town superintendents.

Estimate of Cost of Maintenance.—The commission shall have all State and county highways inspected annually and a report

prepared showing in detail the condition of the highways inspected, the necessary improvements to be made and the estimated cost thereof, and report annually to the legislature the amount required for maintenance for the ensuing year.

District or County Superintendents.—The board of supervisors of any county may appoint a county superintendent of roads and fix his salary. His term of office shall be four years unless sooner removed by the board.

If the board fails to appoint a county superintendent, the commission shall appoint a county superintendent from the eligible list of the county and fix his salary, or, in its discretion, place such county in a district with other counties and appoint a district superintendent therefor. No district shall contain more than 5000 miles of public highways. The commission may remove a county or district superintendent upon written charges and hearing.

The district or county superintendent shall, subject to the regulations of the commission and the State superintendent of highways, have general charge of all highways and bridges in his district or county.

Town Superintendents.—At the biennial town meeting there shall be elected in each town a town superintendent of highways, who must be a resident of the town. The town may, after petition of taxpayers, vote to have the town superintendent appointed instead of elected. In such case the town board shall appoint a superintendent to hold office for the biennial term. The town board may in its discretion appoint a deputy town superintendent. The compensation of the superintendent and his deputy shall not be less than \$2 nor more than \$5 per day. The town superintendent shall, subject to the regulations of the commission, have the care and supervision of the highways and bridges of the town and cause them to be kept in repair and free from obstructions, and shall make inspections during the months of October and April of each year. He may employ such persons and teams as may be necessary. He shall inspect all highways which shall be improved as State or county highways when so directed by the district or county superintendent. He shall report annually on such date as may be set by the commission, prior to November 15, to the district or county superintendent in relation to the highways and bridges in his town.

Contracts for Construction of Town Highways.—A town board may provide that construction, the cost of which will exceed \$500, shall be done under contract to be awarded by the town superintendent in accordance with the estimates, plans, and specifications, to be furnished by the district or county superintendent or by the commission. Contracts are subject to the approval of the district or county superintendent.

Measurement of Highways and Report.—The town superintendent shall measure the highways of his town as the State commission shall direct, and shall indicate in his report the town highways which have been surfaced with gravel, those which have been surfaced with crushed stone, and those which have been shaped and crowned.

Application for Service of Prisoners.—The town superintendent may with the consent of the town board, request the supervisors of the town to secure the service of the prisoners in the county jail for work upon the county highways.

State Aid.—The town superintendent shall annually on or before October 31, make a written statement of the amount of money which should be raised by taxes in the town for the ensuing year for repair or improvement of highways. Such amount shall not be less than an amount which when added to the amount received from the State will equal \$30 for each mile of highway within the town. The town board shall consider such estimates and after approval by them, the town clerk shall transmit a copy of such approved statement to the commission. The supervisor shall also submit such statement to the board of supervisors and such board shall cause the necessary taxes to be levied and collected in such town. Certain limitations as to the amounts to be raised by the town board through taxation are made by law. The supervisor may when authorized by the town board borrow money in anticipation of the taxes to be levied and collected. Towns may borrow money upon bonds if authorized at a regular or special town meeting.

There shall be paid by the State to the towns an amount based upon the taxes levied therein, as follows: (1) Where the assessed valuation is less than \$5000 for each mile of highway in such town, outside of incorporated villages, an amount equal to the amount of such taxes; (2) Where such assessed valuation is \$5000 or over and less than \$7000 for each mile, an amount equal to 90 per cent of such taxes; (3) Where such assessed valuation is \$7000 or over and less than \$9000 for each mile, an amount equal to 80 per cent of such taxes; (4) Where assessed valuation is \$9000 or over and less than \$11,000 for each mile, an amount equal to 70 per cent of such taxes; (5) Where such assessed valuation is \$11,000 or over and less than \$13,000 for each mile, an amount equal to 60 per cent of such taxes; (6) Where the assessed valuation is \$13,000 or over for each mile, an amount equal to 50 per cent of such taxes. Provided that no town shall receive in any one year under this section an amount exceeding an average of \$25 per mile for the total mileage of its highways, outside of incorporated villages. In towns where the assessed valuation of real and personal property averages more than \$25,000 for each mile of highway, the amount

paid shall not exceed one-tenth of 1 per cent of such assessed valuation.

The State controller determines the amount due the several towns and draws his warrant upon the State treasurer in favor of the county treasurer, for the total amount to be paid to the towns in such county, and the county treasurer pays to the supervisor of each town the amount to which such town is entitled as indicated by the controller. The supervisor of the town is the custodian of the highway funds and is responsible therefor, and shall present to the town board annually a report showing the money received from the State; from taxes levied and collected; from the issuance and sale of bonds and certificates of indebtedness, and from penalties. He shall also show the expenditures during the year. The clerk of the board of supervisors shall transmit three copies of the proceedings of the board of supervisors containing such report to the State highway commission, and three copies to the State controller. The State highway commission prescribes method of keeping town accounts of moneys received and expended.

State and County Highways.—A system of State highways is set forth in the highway laws of the State and the routes described. Such State highways are to be improved from the funds derived from the sale of State bonds issued under authority of a law enacted in 1906 and amended in 1907. The law provides that not more than one-half of the amount appropriated each year from the proceeds of such bonds shall be expended in the construction and improvement of State highways. The State highways are constructed entirely at the expense of the State.

County Highways.—The board of supervisors of any county may pass a resolution requesting that a certain designated highway be improved as a county or State highway. The commission after receipt of such resolution shall examine the highway and approve or disapprove such resolution. If it approves it shall direct the division engineer to make surveys and prepare plans and specifications. The commission shall then cause such plans and specifications to be sent to the district or county superintendent, who shall personally examine the highway and recommend any modifications that may be necessary. The commission may then finally adopt the plans, specifications and estimates, and if such highway be a State highway the commission shall proceed to advertise and award contracts. If it be a county highway, the commission shall transmit the plans, specifications and estimates to the board of supervisors of the county for final approval. When final approval has been obtained the improvement of such county highways shall be taken up and carried forward by the commission. State and county highways shall be improved by contract. The performance of every contract for the construction or improvement of a State

or county highway shall be under the supervision and control of the State superintendent of highways, and he has supervision over the deputies, division engineer, and employees, except the secretary of the commission. Upon the completion of a State highway the division engineer with the county or district superintendent shall inspect the same and report to the State superintendent and if he approves he will report to the commission for final approval.

The resolution of the board of supervisors of any county for the improvement of a county highway shall appropriate an amount sufficient to pay the share of the cost to be borne by the county and town. After final payment under a contract for improvement of a county highway the State commission shall prepare a statement of cost and a duplicate shall be filled with the county treasurer. If the county board of supervisors shall have theretofore provided funds to pay 2 per cent of the cost of such county highway for each \$1000 of assessed valuation of real and personal property in said county, for each mile of public highway in such county, and have theretofore provided funds to pay on behalf of the town 1 per cent of the cost of such highway for each \$1000 assessed valuation of real and personal property in said town for each mile of highway within said town, not to exceed 35 per cent of the cost for the county and 15 per cent for the town, it shall be the duty of the county treasurer to pay the amount thereof upon the requisition of the commission.

The county treasurer is authorized to borrow a sufficient amount to pay such share in anticipation of taxes to be collected therefor. The board of supervisors may by resolution authorize the issuance of county bonds to an amount not exceeding the share of the county as apportioned by the commission.

Maintenance of State and County Highways.—Maintenance and repair of State and county highways shall be under the direct supervision and control of the commission, except the cost of maintaining bridges having a span of five feet or over. The work shall be performed by the town or the district or county superintendent subject to the supervision of the State superintendent of highways. The State commission also has power to provide for a system of patrol of such highways, or adopt such other system as may be expedient to secure constant observation and maintenance. The State superintendent appoints the patrolmen subject to the approval of the commission and he has power to purchase materials for such maintenance.

An annual appropriation is made for maintenance of State and county highways upon estimates submitted by the commission to the legislature. Each town shall pay for the maintenance of State and county highways each year \$50 for each mile of said

highways within the town. The amount apportioned by the commission for the maintenance of State and county highways in each town together with the amount paid by each town shall be expended for the maintenance of such highways.

Whenever any county has constructed or maintained a county road as defined in class three without expense to the State, the State shall annually contribute to the expense of maintaining such road 50 per cent of the amount appropriated by such county for the maintenance of such road during the preceding year. The sum paid by the State for this purpose shall not exceed in any one year one-tenth of 1 per cent of the taxable property in such county.

Construction of Highways by County and Town.—The county supervisors may provide for the construction or improvement of a highway in one or more towns at the joint expense of the county and town and determine the proportion of expense to be borne by the county and town respectively.

State Road Funds.—A State bond issue of \$50,000,000 was authorized in 1906, of which there had been appropriated to 1911 inclusive \$48,955,000 leaving a balance unappropriated of \$1,045,000. The \$50,000,000 issue of bonds authorized by the constitutional amendment was originally intended for the improvement of a system of county highways aggregating about 8380 miles. To this mileage was added a system of State routes aggregating 3300 miles, the entire cost of the latter to be paid by the State. The State commission of highways recommends in its last report that an additional State bond issue of approximately \$50,000,000 will be required to complete the system of State and county highways.²⁸

NORTH CAROLINA

State Highway Officials.—The North Carolina geological board is authorized to advise with the township and county authorities in the construction and improvement of the public roads giving said local authorities advice as to the best methods of highway and bridge construction. The said board through the State geologist may make inquiry in regard to system of road building and managing, make investigations and experiments concerning best methods of road construction and the best kind of road material and shall disseminate such information by lectures and the publication of bulletins and reports. They shall also compile statistics on road building in the state and disseminate the same.

State Highway Fund.—The sum of \$5,000 is annually appropriated for the purpose of carrying out the provisions of this act.

²⁸ Digest based upon compilation prepared by State department of highways.

Convict Labor.—When any county has made provisions for working convicts upon public roads the judge holding court in such county shall sentence the following convicts to such work; first, all persons convicted of crimes, the punishment of which is imprisonment in the county jail; second, where the punishment is confinement in the state prison not exceeding ten years; third, those sentenced to imprisonment in the county jail by a magistrate, and insolvents for non-payment of costs in criminal cases.

General Summary.—Nearly every county in North Carolina has special laws governing the method of road construction, taxation for roads, etc. In some of the counties the roads are worked with the county as a unit, and in others with the township as the unit, the county sometimes having control of the work in each township, but often each township has direct control of its own roads. In many of the counties all able bodied men are still required to work a certain number of days on the public roads or in lieu thereof pay a certain sum into the township or county treasury for road work. The legislature has authorized the county commissioners of many of the counties to levy special road taxes varying from a few cents to fifty cents on the \$100 worth of property, and this is done at the discretion of the county commissioners. The legislature has also in many counties authorized the county commissioners to call an election regarding the issuance of bonds for road purposes.²⁹

NORTH DAKOTA

State Highway Officials.—A law was passed in 1909 establishing a good roads experiment station at the city of Bismarek for the purpose of ascertaining the most practical and economical construction and maintenance of public roads in the State. The board of trustees of public property has general supervision over the roads constructed under this act.

The State engineer is required to furnish plans, specifications, and supervise the construction and maintenance of the roads constructed under this act subject to the general control by the board of trustees.

Convict Labor.—To carry out the provisions of this act the warden of the State penitentiary, upon requisition of the board of trustees of public property, shall furnish convict labor not otherwise employed.

The trustees of the penitentiary may employ convict labor for improving the roads and streets used as approaches to the penitentiary, the capitol, or other public institutions.

²⁹ Digest revised and approved by Dr. Jos. Hyde Pratt, State geologist, January 9, 1912.

Roads be to Improved.—The roads designated for improvement under the experiment station act are those leading from the State capitol to the house military reservation of Fort Lincoln, and from the State penitentiary to the Missouri River.

Concurrent Resolution.—A concurrent resolution was passed by the 1911 session of the legislature providing for an amendment to the constitution which will enable the State to grant aid in the construction of highways. If this passes the 1913 session it will be submitted to a vote of the people, and if passed, laws providing for state aid in the construction of highways can be passed by the 1915 session of the legislature.

County Superintendents of Highways.—A law was also passed providing that the county commissioners may at their option appoint a county superintendent of highways and deputy superintendents in organized counties, who shall have charge and supervision of the construction, improvement and maintenance of roads within said counties.

Automobile License.—A law was passed by the 1911 session of the legislature providing for a license fee of \$3 for each motor vehicle operated, and the law further provides that the money received for licenses, less the cost of tags and clerical expenses, shall be returned to the county from which it originates to be used for maintenance and repair of highways. It is estimated that the amount returned to the counties for the year 1911 will be about \$18,000.

General Summary.—Under the North Dakota highway laws, in counties having no civil township organization, the county board of commissioners act as a highway board; in organized townships the authority is vested in the board of supervisors. In localities where there are unorganized townships the county commissioners may create as many road districts as in their judgment is deemed expedient, and may appoint for each district a road supervisor. Township supervisors may divide the township into as many road districts as may be required, but this must be done at least twenty days prior to the township elections. Road overseers are elected annually on the third Tuesday of March. In counties where county superintendent of highways is appointed, the deputy county superintendents are appointed to take the place of road overseers.

Highway maintenance funds are secured in this State by means of poll and property taxes and automobile and motor cycle licenses, as stated above. A poll tax of \$1.50 is levied on every male person between the ages of twenty-one and fifty years, and a property tax from 1 to 5 mills on the dollar may be assessed by the county, which may be paid in cash or by labor at the rate of not less than \$1.50 nor more than \$2 per day. The township may

levy a maximum highway tax of 8 mills on the dollar, which may be paid in cash or by labor at the rate of not less than \$1.50 nor more than \$2 per day.³⁰

OHIO

State Highway Officials and Their Duties.—The highway department shall be divided into three bureaus, to be known as the bureau of construction, the bureau of maintenance and repair, and the bureau of bridges. The governor, with the advice and consent of the senate, shall appoint a State highway commissioner who shall serve for the term of four years, at a salary of \$4000 and necessary traveling expenses, not to exceed \$1200 in any one year. He shall be a competent civil engineer and experienced in the construction and maintenance of roads and bridges. He shall give a bond of \$10,000.

Subject to the approval of the governor, the State highway commissioner shall appoint three deputy highway commissioners, not more than one of whom shall be of the same political party as himself, who shall be competent civil engineers, and serve during the pleasure of the commissioner. One of these deputy highway commissioners shall be experienced in road construction and improvement, and acting under the direction of the highway commissioner, shall have supervision of all matters pertaining to road construction and improvement as provided for in this chapter. Another of said deputies shall be experienced in road maintenance and repair, and acting under the direction of the highway commissioner shall have supervision of all matters pertaining to road maintenance and repair. Another of said deputies shall be experienced in the design, construction, and maintenance and repair of culverts and bridges, and acting under the direction of the State highway commissioner, shall have supervision of all matters pertaining to the design, construction, maintenance and repair of culverts and bridges.

The highway commissioner shall appoint not to exceed eight division engineers, one chief clerk and not to exceed eight clerks or stenographers.

The State highway commissioner shall have general supervision of the construction, improvement, maintenance and repair of all highways, bridges and culverts which are constructed, improved, maintained or repaired by the aid of State money. He shall aid county commissioners in establishing, creating and preparing suitable systems of the drainage of highways, and advise with them as to the construction, improvement, maintenance and repair of

³⁰ Digest revised and approved by Mr. T. R. Atkinson, State engineer, December 26, 1911.

highways, and the design, construction, maintenance and repair of bridges and culverts. He shall cause plans, specifications and estimates to be prepared for the construction, maintenance or repair of bridges and culverts, when so requested by the authorities having charge thereof; he shall carry into operation the provisions herein relating to his office and all other laws providing for the coöperation of the State with local authorities in the construction, improvement, maintenance and repair of public roads, bridges and culverts. He shall make inquiry in regard to systems of road and bridge construction and maintenance throughout the United States, conduct investigations and experiments, either in person, by deputy or engineer, in regard to the best methods of road and bridge construction and the best kinds of road and bridge materials, examine the chemical and physical character of such materials, and he may prepare and publish and distribute bulletins and reports. He may cause to be made such surveys, plats, profiles, specifications and estimates of those highways hereinafter referred to as "inter-county highways" as he may deem necessary. All expenses incident thereto shall be paid out of any fund or funds available for the use of the department.

He shall call an open meeting to be held at the office of the county commissioners within each county of the State at least one day in each calendar year, for the purpose of affording instruction relative to matters pertaining to road and bridge construction, maintenance and repairs. Such meeting shall be conducted by the State highway commissioner or one of the deputies or division engineers designated for the purpose by the State highway commissioner.

The apparatus and supplies of the College of Agriculture and Engineering of the Ohio State University may be used by the State highway commissioner in making investigations concerning the chemical and physical character of road and bridge materials, if the president of such university consents, and such investigations are made without interference with the regular work of the university.

It shall be the duty of the State highway commissioner and his deputies to determine from the statistics and information furnished by the county and township officials to the State highway commissioner, the relative importance, and value for commerce, of the various public highways of the entire State. They shall designate by name and number the main roads of the State which shall be known as "inter-county highways;" and the parts thereof in each county shall be designated so as to form as near as practicable continuous and connected highways and shall designate the order of their relative importance within the county. They shall begin work as soon as the necessary information is furnished the State

highway commissioner, and shall complete the work and file their report with the governor within two hundred and forty days from the date of commencing the work, unless further time be granted them for such purpose by the governor. So much of such report shall be printed under the direction of the State highway commissioner as he may deem necessary and a copy thereof shall be immediately furnished the board of county commissioners of each county of the State and shall be carefully preserved in the office of the county auditor thereof. After the filing of such report the State highway commissioner may, subject to the approval of the governor, designate additional roads as "inter-county" highways.

He is authorized to receive and pass upon applications from the county officials for State aid. If he approves such application, he shall certify the same to the county commissioners making said application. Applications not approved by him are placed on file for future action, or until withdrawn by the county commissioners, with the consent of the highway commissioner. After the commissioner has approved an application for State aid, such approval being based on the location and value of the road sought to be built, he shall cause a map of the highway in outline and profile to be made, and suitable plans and specifications for a brick, telford, macadam, gravel or other roadway, to be prepared. He shall also cause to be made plans and specifications for all bridges and culverts necessary on the highway, or section thereof, and shall transmit a copy thereof to the county commissioners, who shall construct such bridges and culverts in accordance with said plans. Upon the completion of the maps, plans and specifications, he shall cause an estimate of cost of construction to be made, and transmit a copy thereof to the county commissioners, who, by a majority vote, may approve the construction of said road, transmitting a certified copy of their resolution to the State highway commissioner. Upon the receipt of such resolution the commissioner shall advertise for bids, and, subject to the approval of the county commissioners, award the contract for such work to the lowest bidder, provided said bid be within the estimated cost of said road. If no acceptable bid is received within the estimated cost, the commissioner may re-advertise or amend such estimates and certify the same to the county commissioners. If the county commissioners adopt said amended estimate, bids may be again advertised for, and contract awarded, the State highway commissioner having the right to reject any or all bids. Upon the completion of the work, the said commissioner shall ascertain the cost of such improvement, and apportion same as provided for by law.

In the event of more than one township in a county making application for road improvement, the State highway commissioner shall select such roads named in the application, as he deems

to the best interests of the public. He shall also make final decision as to the materials to be used in the construction of any road.

Highways improved or constructed under the provisions of any act providing for aid by the State shall be kept in repair and maintained by the State highway commissioner. The expense of such repair and maintenance shall be divided and payable 25 per cent thereof by the State, 50 per cent thereof by the county and 25 per cent thereof by the township or townships. The State's share being payable from moneys appropriated by the general assembly for the purpose; the county and township shares from their respective road or road repair funds.

The State highway commissioner shall make a detailed report to the governor each year, showing the operations of the highway department.

Local Officials and Their Duties.—The commissioners of a county, may, by a properly certified resolution setting forth that the public interests demand the improvement of a certain highway, described therein, make application to the State highway commissioner for aid from a State appropriation for the construction and repair of highways. Such application must be made prior to May 1, preceding the date when such appropriation becomes available, and shall not include any portion of a highway within the limits of a city. Upon failure of the county commissioners to make such application within said time limit, the trustees of a township of such county may apply prior to the first day of July next succeeding in like manner for aid from such appropriation. Such application shall contain an agreement on the part of such township to pay one-half of the cost of construction, including surveys and other necessary expenses, by an assessment on the township of 35 per cent and 15 per cent on the property fronting on such road or highway. The State highway commissioner may act on the application of said township trustees in same manner as upon applications made by county commissioners. And if the township trustees do not make use of the appropriation prior to the first day of July next succeeding, then the State highway commissioner shall have full power and authority to enter upon and construct, improve, maintain or repair any of the inter-county highways or parts thereof, of said county, either by contract, force account; or in such manner as the State highway commissioner may deem for the best interests of the public, paying the full cost and expense thereof from the said apportionment of the appropriation to said county so unused as aforesaid.

Upon the receipt of an approval of an application from the State highway commissioner, together with proper plans, maps, and specifications, the county commissioners or township trustees may, by a majority vote, adopt a resolution authorizing said high-

way to be constructed, transmitting a copy of such resolution to the State highway commissioner. If the lines of a proposed highway deviate from those of an existing highway, the officials making said application must provide the requisite right of way, and secure proper releases of damages, prior to the commencement of the work.

The county commissioners may, upon the petition of the owners of 51 per cent of the lineal feet of adjacent property, order the improvement of a public road, or section thereof, at least one mile in length, or less than one mile if it is an extension or connected with a permanently improved street or highway of improved construction. And they may require that the township or townships through which such road extends shall pay 25 per cent of the cost, and that the trustees thereof shall approve same. The county commissioners by resolution may relieve the township or property owners from any assessment. If more roads are petitioned for than can be constructed in any one year, the State highway commissioner and the county commissioners shall decide upon the road to be first improved, having in mind the importance of such road to the county or township.

No contract for road improvement unless otherwise provided shall be let until the county commissioners and trustees of the township in which such improvement is to be made, shall enter into a written agreement to assume their respective share of the cost thereof.

The county commissioners of any county may, by resolution waive any or all of the apportionment of the expense of highway improvement to be paid by townships or abutting property owners, and assume any part or all of the cost of such road improvement; and the township trustees may, in like manner, waive any or all of the apportionment of the expense to be paid by the county or abutting property owners, and assume any part or all of the cost of such road improvement in excess of the amount received from the State.

Road Revenues and Their Distribution.—Whenever there are one or more improvements to be made in any county and the cost and expense thereof is equal to or is less than twice the amount apportioned by the State to a county, then the State shall pay 50 per cent of such cost and expense.

Whenever there are one or more such improvements to be made in any county and the cost and expense thereof exceeds twice the amount apportioned by the State to a county, then the State shall pay the amount of the apportionment for said improvement or improvements apportioned as may be agreed upon by the State highway commissioner and the county commissioner.

Except as otherwise provided in this chapter, the county shall pay 25 per cent of all cost and expense of improvement.

Except as otherwise provided one-fourth of the cost and expense of such improvement shall be apportioned to the town hip or townships in which such road is located. Of the amount so apportioned three-fifths shall be a charge upon the whole township or townships and two-fifths shall be a charge upon the property abutting on the improvement. The township trustees shall apportion the amount to be paid by the owners of the abutting property according to the benefits accruing to the owners of land so located. At least ten days' notice of the time and place of making such apportionment shall be given to the persons affected thereby, and an opportunity given them to be heard in the manner provided by law for the assessment of the cost and expense of establishing county roads. If the improvement lies in two or more townships the amount to be paid by each shall be apportioned according to the number of lineal feet of the improvement lying in each township.

When an improvement of a highway shall be made by the State in conjunction with a township or townships, 35 per cent of the total cost and expense thereof shall be assessed on the township or townships and 15 per cent of the total cost and expense thereof shall be assessed on the land abutting on such highway.

The amount appropriated for State aid shall be equally divided among the counties of the State, but shall remain in the State treasury until applied for as by law.

County commissioners or township trustees may, by unanimous vote, provide for the issuance of bonds, bearing not to exceed 5 per cent interest, for the payment of the cost and expenses of a highway under the provisions of this act. At their March and June sessions each year the county commissioners may levy on each dollar of taxable property in the county, not exceeding 1 mill, for the creation of a fund to be known as the "State and county road improvement fund," such amount to be used for the improvement of State and county roads within the county, and be in addition to the amount levied for road and bridge purposes.

Automobiles.—Motor vehicles shall be registered by making application therefor to the secretary of State, and the payment of a fee of \$5 for gasoline or steam motor vehicle, and \$3 for an electric vehicle. Chauffeurs are required to pay a license fee of \$2 for operating motor vehicles. Manufacturers and dealers may pay a registration fee of \$10 and be relieved from any individual registration of motor vehicles. Non-residents shall be exempt from the payment of any tax, provided they shall have complied with the laws of their own State, and the laws of both States be substantially the same with regard to motor vehicles. Heavy penalties are provided for the violation of this act. The revenues derived from the registration fees, shall, after the payment of

expenses incident to the enforcement of this law, be paid into the State treasury monthly, by the secretary of State, and shall be maintained as a separate fund for the improvement, maintenance and repair of public roads and highways, and shall be apportioned in the same manner as the State highway fund.

Braun County Aid Law.—The board of commissioners of any county are authorized under this act to lay out, construct or improve any public roads.

When a majority of the owners of real estate lying within one mile of any public road shall present a petition to the county commissioners asking for the improvement or alteration of such road and file bond with security for the payment of the cost of the preliminary survey, the county commissioners may appoint the county surveyor as engineer to make surveys, estimates and specifications. When such road is on a county line between two or more counties the commissioners shall file certified copy of the petition and bond with the commissioners of each of the counties touching the road. The several boards of county commissioners shall thereupon act jointly.

When the improvement is wholly within one county the commissioners shall after receipt of estimate of the engineer publish notice that the improvement is about to be made. If the road is on a county line the engineer shall transmit his report to each board of county commissioners and they shall each publish notice that improvement is about to be made. Claims for damages shall be filed in writing with the board of county commissioners of the county in which the land is situated. After hearing the board of county commissioners may order that improvement be made and adopt plans and specifications.

After making such order the work shall be let by the county commissioners or the joint board to the lowest responsible bidder who shall give bond.

When the improvement is wholly within one county the cost of said improvement shall be apportioned by the commissioners as follows: Not less than 35 per cent nor more than 50 per cent shall be paid from levy upon the taxable property of the county; not less than 25 per cent nor more than 40 per cent shall be paid from levy upon the taxable property of the township within which the improvement is to be made; and the balance, which shall not be less than 20 per cent nor more than 35 per cent shall be collected from the owners of real estate lying within one mile of the road to be improved. When any part of the improvement is in more than one county or on county lines the expense shall be divided between the counties in the proportion the distance in such county bears to the whole distance improved.

If there are not sufficient funds available the county commis-

sioners are authorized to levy upon the taxable property of the county a tax not exceeding in the aggregate in any year 1 mill upon each dollar of value, said levy to be in addition to all other levies authorized by law. The commissioners are authorized to levy upon the taxable property of any township in which such improvement is situated a tax not exceeding 10 mills in any year upon each dollar of valuation said levy to be in addition to all other levies authorized by law. The county commissioners are authorized to sell the bonds of the county to any amount not exceeding the amount necessary to pay the respective shares of the county, township and land owners, the bonds to bear interest not to exceed 5 per cent per annum and to mature in not more than five years after they are issued.

Such highways shall be kept in repair by the county commissioners.

Proposed State Bond Issue.—The constitutional convention has approved the plan of the Ohio Good Roads Federation which, if adopted by the people, as an amendment to the constitution, will permit the issuance of \$50,000,000 of State bonds for road construction purposes, and under this proposed amendment the State will pay the entire cost of construction from the proceeds of the bonds, and it is proposed that the maintenance be taken care of by direct State levy.³¹

OKLAHOMA

Constitutional.—The legislature is directed to establish a department of highways and shall have power to create improvement districts and provide for building and maintaining public roads and may provide for the utilization of convict and punitive labor thereon (Con. 1907, art. 16, sec. 1).

State Highway Department.—A State highway department is created and established and the governor shall appoint a State highway commissioner, to be approved by the senate, who shall hold office for four years. The commissioner, so appointed, shall be a person of recognized knowledge in the construction and maintenance of improved roads, shall receive a salary of \$2500 and actual traveling expenses not to exceed \$1500 a year, shall take the prescribed oath of office and give a bond to the State in the sum of \$500 for the faithful performance of the duties. A vacancy in the said office shall be filled in like manner as the original appointment.

³¹ Digest of State aid laws prepared by State Highway Commissioner J. R. Marker, January 1, 1912.

All section lines in the State of Oklahoma are declared public highways. The public highways shall not be less than 33 feet nor more than 66 feet in width, the width to be determined by the county commissioners when established.

The said commissioner shall have suitable offices at the State capitol. The said commissioner shall keep a record of all the proceedings of the State highway department, shall employ an assistant engineer, or engineers, and such clerical force as may be necessary to conduct his department, at an annual expense not to exceed \$5000. He shall prepare standard specifications for construction and maintenance of roads, and exercise authority in all matters relating to plans for the building and maintenance of improved public highways. He shall cause to be made and kept a general highway plan of the State and shall collect information relative to mileage, character, construction and condition of the highways throughout the State and all other matters of interest in connection with the highway work of the State.

All local road officials are required to furnish the said State highway commissioner with any information which he may require, concerning the cost of building and maintaining the highways in their jurisdiction.

The State highway commissioner may, with the approval of the State board of affairs, purchase for the State all necessary office equipment or instruments that may be needed for the purposes of this act.

For the purpose of carrying out the provisions of this act and creating a fund for the maintenance of this department, a State license of \$1 shall be charged annually to the owner of each automobile in the State. Said license fee shall be collected by the State highway commissioner and shall be used for the payment of the salary of the highway commissioner and for the expenses of said office. Any surplus shall be paid into the State treasury. Non-residents, operating automobiles within the State, shall be required to pay the same license as provided for residents.

Nothing herein shall be construed as limiting the power of the State to construct and build State highways and pay all costs of constructing and maintaining same, under direction of the State highway commissioner (L. 1911, H. B. no. 318).

The township boards of supervisors shall have power, upon their own motion, to open and establish public roads on section lines only in their township where the right-of-way can be obtained by amicable settlement; the county commissioners shall have power and authority, upon their own motion, to open and establish public roads on section lines anywhere in the county and obtain the right-of-way therefor, either by amicable settlement or condemnation. When there is public necessity therefor the county

commissioners shall, upon the petition of the township board or of the resident free-holders of the township, open and establish any public road in such township along the most practicable lines.

By virtue of their office the township board of each municipal township in the State are made highway commissioners for such township and shall have supervision and control of the highways within their respective townships. Each member of said board of highway commissioners shall receive as compensation \$2 per day for each day actually engaged in working, not to exceed ten days in any one year, which shall be paid from the township road and bridge fund.

Said board of highway commissioners shall divide their township into a sufficient and convenient number of districts, of not less than 4 square miles each, and shall each year appoint one road supervisor for each such district. Each road supervisor, so appointed, shall be a resident tax-payer of the district from which he is appointed and shall take the oath of office before entering upon his duties and shall receive \$2 per day compensation for services, not exceeding forty days in any one year (L. 1909, ch. 32, art. 1, sec. 1-16).

Taxation.—Every male citizen, between the age of twenty-one and fifty years, having resided in the State thirty days, except such as are exempt by law, shall be subject to road duty of four days, of eight hours, each year, or furnish a substitute for same, or in lieu thereof to pay \$1.25 for each day so required of him.

The board of county commissioners shall require the road supervisor of any road district to work out upon the highways of any road district 50 per cent of the road duty therein, before the first day of July each year, and the remaining 50 per cent before the first day of January following.

The township board of any township in the State shall levy a general road and bridge tax on all taxable property within their respective townships, not to exceed 5 mills on the dollar of such taxable property, the proceeds of which shall be credited to the township and expended under the direction of the board of county commissioners (L. 1909, ch. 32, art. 1, sec. 17-29).

Contracts.—The board of highway commissioners, in any township, may let any piece of road or bridge work to contract to the lowest responsible bidder, after due advertisement for bids for same (L. 1909, ch. 32, art. 1, sec. 17-29.)

County Highway Engineer.—The board of county commissioners of each county is empowered to appoint a highway engineer, at its first meeting, every January 1 of each year. Where competent and not otherwise incapable of performing the duties of county engineer, the person appointed shall be the county surveyor. Bond is required of the said engineer before entering upon his duties

and his compensation is limited to not exceed \$5 per day for time actually employed.

Said county highway engineer shall be a resident of the State and of the county and shall have a practical knowledge of civil engineering. He shall, when requested by the county commissioners, or the board of highway commissioners, or road supervisors within his respective county, give such instruction and advice, with reference to the construction, building or repair of any roads and bridges therein and shall perform such other details, as may be required of him by said authorities (L. 1909, ch. 32, art. 1, sec. 33-38).

Convict Labor.—The board of county commissioners of any county may purchase teams, vehicles, machinery, portable lock-ups and such other equipment as may be necessary for the employment of convicts or other labor upon the public roads. They shall have authority to work all convicts confined in the county jail upon the public highways in such county and employ such guards as may be required.

Any person working upon the public roads in lieu of payment of fine and costs shall be allowed a credit of \$1 per day on such fine and costs. Said boards of county commissioners have authority to receive, by agreement of the city council, the prisoners of any city who have been sentenced to the city prison for a crime committed or in lieu of fine and costs, provided the commissioners shall not pay for the services of such prisoners except for the cost of their maintenance. Said boards of county commissioners shall purchase necessary supplies, etc., for maintaining such convicts, said purchases to be made from the lowest and best bidder after reasonable public notice (L. 1909, ch. 32, art. 1, sec. 40-46).

The State board of prison control is authorized to provide transportation and all necessary stockades, guards, portable prisons, implements, conveyances, teams, tools and all other necessary equipment for working convicts on the public roads of the State; provided said convicts shall be equally distributed, as near as practicable, among supreme court judicial districts of the State and worked among the various counties therein. Said work shall be performed upon such roads as are designated by the county commissioners of the county in which the work is done and the work shall be done in such manner as may be determined by the said board, provided that the county shall bear all expenses of the cost of material for road improvement therein.

The State convicts assigned to work upon such roads shall be divided into groups of not exceeding 100 men in each group, and only one group shall be worked in one county at the same time and no group shall be allowed to work in any one county for a longer period than five months in any one year, nor shall any two groups

be worked in any county until all the counties, making application for the same, shall have received their proportion of work from said convicts (L. 1909, ch. 32, art. 1, sec. 50-51).

Bond Issues.—The township board of any township may issue bonds, in an amount not exceeding 3 per cent of the taxable property of said township, upon a favorable three-fifths vote for same, at an election held for that purpose. Said bonds shall bear interest at the rate of 6 per cent and run not exceeding twenty-five years (L. 1909, ch. 32, sec. 47-49).

Bridge Bonds.—The county commissioners of any county are authorized, upon a three-fifths favorable vote at an election held for that purpose, to issue bonds of such county for the purpose of building, constructing, repairing and acquiring bridges; such bonds to run not exceeding twenty-five years and to bear interest not exceeding 5 per cent per annum (L. 1909, ch. 32, art. 2, sec. 1-12).

Toll Bridges.—Provision is made whereby the county commissioners may buy toll bridges erected over public highways in the state (L. 1909, ch. 32, art. 5, sec. 1-6).

Road Improvement Districts and Bond Issues.—Road improvement districts, of not less than 18 square miles in area, may be created in any county, upon written petition, signed by 15 per cent of the qualified electors of the proposed district, being filed with the county clerk of such county. Such petition shall state the metes and bounds of the proposed district, the highway or highways to be improved and the general character of the improvements to be made and ask that a vote be taken on the question of issuing the bonds of such road improvement district. The county clerk shall notify the county commissioners of such petition, who shall appoint a time for a hearing and consideration of the same. At such meeting the said board of county commissioners shall investigate the said petition and, if found to comply with the law in every particular, then an order shall be entered establishing and creating such road improvement district and fixing the amount of bonds to be issued, which shall in no case exceed 5 per cent of the valuation of the taxable property in such district, and shall order an election therein to determine the question of issuing such bonds.

At such election every qualified elector residing within such road improvement district shall be entitled to vote and three-fifths of all the votes cast are required before said bonds shall be issued. Said bonds, if issued, shall bear interest at 5 per cent and run for not exceeding twenty-five years. In case said bonds are issued it shall be the duty of the board of county commissioners of each county to levy annually upon all the taxable property in each such

road improvement district therein a tax sufficient to pay the interest and create a sinking fund for the redemption of said bonds.

After said bonds shall be issued the county commissioners shall have charge of the improvements to be made therewith, and shall let the same to contract to the lowest and best bidder, after due advertisement for bids, having the right to reject any and all bids, and the board of county commissioners has power to do everything necessary to properly execute said improvements (L. 1911, H. B. no. 558).³²

OREGON

Constitutional.—No county shall create any debts or liabilities which shall singly or in the aggregate exceed the sum of \$5000, except to suppress insurrection or repel invasion, or to build permanent roads in the county, but debts for permanent roads shall be incurred only on the approval of a majority of those voting on the question (Con., art. 11, sec. 10).

Statutory.—It shall be the duty of the secretary of State to cause a complete copy of the road laws of the State to be printed, and revise same after the termination of each session of the legislature (Lord's *Oregon Laws*, sec. 6273).

All county roads shall be under the supervision of the county court. All county roads shall be 60 feet wide, unless the county court shall, upon petition therefor, determine upon a different width, not less than 40 nor more than 80 feet in width. The county courts of the several counties shall, not oftener than once each year, divide their respective counties, or any part thereof, into suitable and convenient road districts and annually appoint a road supervisor for each district, who shall receive a compensation of \$2.50 per day and shall have general supervision over the roads in his district, subject to the county court. The county commissioners or county court of each county may each year, at their regular January session, appoint a road master, or masters, who shall be paid a salary sufficient to justify the employment of a competent person, who can devote his entire time to the work, and he shall have general supervision over the roads of the county (Lord's *Oregon Laws*, secs. 6278, 6293, 6314, 6319, 6322-3).

Taxation.—The county court of each county may levy a tax, of not to exceed 10 mills on the dollar, each year at the time of making the regular annual tax levy, which shall be set apart as a general road fund. The tax-payers of any road district in any county may vote an additional tax, for road purposes, at an election to be held for that purpose, and in such amount as may be determined upon (Lord's *Oregon Laws*, sec. 6320-21).

³² Digest approved by the State highway commissioner, Sidney Suggs, March 16, 1912.

Contracts.—The county court and the road master may execute works of improvement upon the highways by letting the same to contract, or by the employment of men and teams and the performance of the work under the direction of the county road master (Lord's *Oregon Laws*, sec. 6325).

Automobiles.—A license of \$2 is imposed upon motor vehicles and a chauffeur's license of \$2 is also imposed. Application for each shall be to the secretary of State. Non-residents, who have complied with the registration laws of their State, are exempt for a period of thirty days from procuring a license in the State of Oregon. All the moneys collected pursuant to such registration and license, and fines and penalties for violations thereof, shall be paid over to the county treasurer of the county in which the same is collected and applied to the general road fund of the county (L. 1911, ch. 174).

Convict Labor.—All able-bodied convicts, confined in the county jail, may be put to work upon the public highways of the county, under the control of any road supervisor. All such convicts shall work for the entire number of days of sentence imposed upon them, but where sentence is a fine, then \$1 per day shall be credited upon such fine (Lord's *Oregon Laws*, sec. 6432-34).

The superintendent of the Oregon State penitentiary is authorized to furnish and use such convicts as may be necessary to construct or repair the public roads leading from or to the State buildings. He may employ a competent road builder to superintend such work and pay him not exceeding \$60 per month, while actually employed. Each such convict shall receive a credit upon his time of two days for each day he shall faithfully work upon said public roads (Lord's *Oregon Laws*, sec. 6435-37).

Bicycle Paths.—It is made discretionary with the county court of each county to build and maintain bicycle paths along each public highway and a license of \$1 may be imposed on all persons riding bicycles in such county, the proceeds of such licenses to be used for building and maintaining such bicycle paths (Lord's *Oregon Laws*, sec. 6438-46).

Shade Trees.—Provision is made whereby the owners of land along the public highways may plant and cultivate any hedge of trees, for use or ornament, along such public highways, subject to proper restrictions (Lord's *Oregon Laws*, sec. 6470-73).

Provision is made whereby county courts, in sparsely settled communities may lease such roads to any person or corporation to keep the same in repair, for not exceeding ten years, and in consideration thereof collect and receive tolls for travel thereon (Lord's *Oregon Laws*, sec. 6474-87).

The secretary of State is required to ascertain the area of each county in the State and to divide all the proceeds of the 5 per cent

fund in the State treasury, as well as the direct tax fund due and payable to the State upon its compliance with the laws of Congress, Approved March 2, 1891 (L. 1893, ch. 3, sec. 1).³³

PENNSYLVANIA

State Highway Officials and Their Duties.—From and after the first day of June, 1911, there shall be established a State highway department, by the appointment by the governor of a State highway commissioner, who shall serve for a term of four years, and shall give his entire time and attention to the duties of his office. He shall receive a salary of \$8000 per annum, and shall furnish a bond in the sum of \$50,000 to be approved by the governor, for the faithful performance of his duties. The governor shall also appoint two deputy State highway commissioners, to be known as first deputy State highway commissioner and second deputy State highway commissioner, respectively; one of whom shall be a competent civil engineer. They shall each receive a salary of \$6000 per annum, and each give bond in the sum of \$25,000. The governor shall also appoint an auditor of the said department, who shall be an expert accountant and who shall be a certified public accountant. He shall receive a salary of \$3000 per annum and shall give bond in the sum of \$25,000. It shall be the duty of the auditor to examine and audit all the accounts of the department and to countersign all warrants.

The governor shall appoint a chief engineer, who shall be a capable and competent civil engineer, who shall be paid a salary of \$7000 per annum. The State highway commissioner shall appoint as an assistant to the chief engineer, an engineer of bridges, who shall be a capable and competent civil engineer, experienced in the designing and construction of bridges, who shall be paid a salary at the rate of \$3600 per annum. He shall also appoint fifty superintendents, experienced in the construction and maintenance of improved roads, who shall be known as superintendents of highways; he may also appoint fifteen competent civil engineers, a chief draughtsman, four assistant draughtsmen, a chief clerk, four additional clerks and four competent stenographers, and from time to time, such additional stenographers and clerks as the work of the department requires; he may also appoint two competent book-keepers. The State highway commissioner, his deputies and other officers shall be paid their traveling expenses necessarily and actually incurred.

The State highway commissioner is empowered to make and

³³ Digest read and approved by John H. Lewis, State engineer, February 8, 1912.

adopt rules and regulations for conducting the business and work of the department and to prescribe the duties of all appointees and employees. He is authorized and empowered to purchase all machinery, tools and materials of any and every kind necessary in the construction and maintenance of the highways.

The State highway department shall be provided with suitable rooms in the State building at Harrisburg. The State highway commissioner shall carry into effect the provisions of the acts of assembly providing for the operation and coöperation of the State in the construction and maintenance of State and public highways. He shall have charge of the records of the department and shall submit each year to the governor a full report of the operations of the department, together with information concerning the condition of the public roads of the State, and particularly of the State aid and State highways.

The State highway commissioner shall give notice in writing to the proper township or county officers of his intention to take over any highway and of the date when the State highway department will assume the maintenance and care thereof.

All existing public roads, highways, turnpike and toll roads forming and being main traveled roads or routes between county seats and main traveled roads or routes leading to the State line, and between principal cities, borough and towns shall be built, repaired and maintained at the sole expense of the commonwealth; and shall be under the exclusive authority and jurisdiction of the State highway department, and shall constitute a system of State highways, described and defined in Routes no. 1 to no. 296.

The State highway commissioner shall prepare and file for public use in the department, maps of the State highways, and where the expense of constructing a route as at present defined may be materially lessened by a divergence from the route, the commissioner is empowered, with the approval of the governor, to divert the course or direction of same as in his discretion may seem best in order to correct any danger or inconvenience to the traveling public or lessen the cost to the commonwealth.

Where a turnpike or toll road company shall own or control the whole or any part of a route forming a State highway, it shall be the duty of the State highway commissioner to purchase said turnpike or toll road, and if a fair and reasonable price, which shall be approved by the governor, cannot be agreed upon, the State highway commissioner shall then petition the court of quarter sessions of the county in which the State highway is located and said court shall appoint a jury of view to view and condemn said turnpike, toll road or highway and shall appraise and report the damages which the owner or owners shall be entitled to receive therefor. If the amount of damages as finally awarded shall be

deemed excessive by the State highway commissioner, he may refuse to accept the appraisalment or verdict and may then omit such turnpike or toll road from said route of State highway, in which case all court costs shall be paid by the State highway department; and he may select the next best and most suitable and convenient route or road in order to connect up and complete a continuous State highway.

Any apportionment of the State into highway districts shall not include or in any manner interfere with the roads, streets and highways in any of the cities, boroughs, or incorporated towns of the commonwealth; the maintenance of such roads heretofore improved or reconstructed, and which road forms a part of a State highway shall be done by the State highway department, the respective borough or incorporated town in which said work is done to pay 50 per cent of the cost of said maintenance, excepting that where any road, street or highway in any borough or incorporated town has been heretofore constructed as a State aid road with bricks, or material other than a telford, water bound macadam road, or which may hereafter be constructed as a State highway, said road shall be maintained according to the standards of the State highway department wholly at the cost and expense of the borough or incorporated town in which said road, street or highway may lie.

The State highway commissioner is directed to construct or improve, and thereafter maintain and repair, at the cost and expense of the commonwealth, the highways forming the plan or system of State highways in the several counties and townships, specifications for which are to be prepared by the State highway department, the expense for which is to be paid out of moneys specifically appropriated for the purpose.

The State highway commissioner may enter into a contract with any person, firm, or corporation, or the authorities of any borough or incorporated town, or the commissioners of any county, or the supervisors or commissioners of any township, to repair and maintain any highway designated as a State highway. Contracts shall be awarded to the lowest responsible bidder, bond to be furnished by the contractor in a sum equal to 50 per centum of the contract price.

The State highway department shall advertise for proposals for construction, at least three weeks before the contract may be awarded, by public notices inserted once a week in at least two newspapers in the county or counties in which the highway to be improved is located, and may also insert the same advertisement in other newspapers or engineering periodicals. All contracts shall first be approved by the governor, signed by the State highway commissioner, and approved as to form and legality by the attorney-general or deputy attorney-general.

All State highways shall be marked with suitable signs, having the words "State highway" and year date thereon. The State highway commissioner may also cause trees to be planted along the highways. No railroad or street railway shall be constructed upon any State highway except under conditions prescribed by the State highway department.

The manner and method of construction of all State highways to be improved or rebuilt shall be decided by the State highway commissioner before the contract is let; all State highways to be constructed and improved to the width of not less than 12 feet.

The State highway commissioner shall cause to be made a survey of all the roads of the State; and shall cause to be made and kept for the State highway department a general highway plan of the State; and compile statistics and collect information relative to the mileage, character and condition of the highways in the townships and counties of the State. He may be consulted at all reasonable times by county, city, borough, incorporated town or township officers having authority over highways and bridges. He shall prepare and compile all useful information relative to road building and maintenance, which he shall disseminate by means of printed bulletins. He shall cause to be published maps showing complete road surveys of each county, which shall be kept on sale in the State highway department, at cost of publication.

Apportionment of Road Revenues.—Counties and townships desiring State aid shall be entitled to receive the aid and coöperation of the State, upon the payment of 25 per cent of the cost by county and township when the application is made jointly, the State paying 50 per cent of the cost, the township thereafter to pay 50 per cent of the entire cost of maintenance. Where a county or township desires improvement without the joint action or coöperation of the other, then said township or county shall pay the entire 50 per cent of the cost of the road improvement and 50 per cent of the cost of maintenance thereafter. Any township desiring the aid and coöperation of the State in the permanent improvement of any of its roads shall levy a cash road tax to meet the cost thereof and shall levy annually thereafter such further road taxes in cash as are sufficient to pay the township's share of the annual maintenance of such highways.

The State shall not furnish aid for the improvement of a State aid highway until the supervisors or commissioners of the township in which the road desired to be improved lies, where the improvement is intended to be made jointly by township and county, shall first petition the county commissioners; and it shall then be the duty of the county commissioners to adopt a resolution authorizing the assumption by the county of its share of said improvement, the said

county commissioners to then petition the State highway department for the aid desired.

Where the owners of the majority of the assessed valuation of real estate desire any principal road lying in their township to be improved as a State aid highway, they may petition the supervisors or commissioners of their township and require them to petition the county commissioners to make application to the State highway department for said improvement and maintenance.

In case of refusal or delay by county commissioners or township supervisors to act upon any petition for the improvement and maintenance of any highway as a State aid highway, any citizen, taxpayer of the township or county may present the facts of the matter to the court of quarter sessions, and, after due hearing had by said court, the court shall make an order directing the township supervisors or commissioners or county commissioners to act upon said application for State aid and that the said application be forwarded to the State highway department.

The State aid fund appropriated shall be ratably apportioned among the several counties according to the mileage of township and county roads in the respective counties. No section of State aid highway shall be less than one-half mile in length.

The word "highway" shall be construed to include any existing causeway or bridge, or any new causeway or bridge, or any drain or watercourse, which may form part of a road, and which has been or might properly be built by the townships of the commonwealth. A "State aid highway" shall be construed to mean only such highway as is improved with the aid and coöperation of the State with county and township, or with county or township, borough or incorporated town, either or severally, but shall not include any causeway or bridge which should properly be built by the county or by the State.

Appropriations.—The sum of \$3,000,000 is appropriated for the purpose of maintenance, repair and construction of the State highways and for the payment of the State's share of the maintenance and repair of State aid highways heretofore constructed; the sum of \$1,000,000 is appropriated for the purpose of State aid in the permanent improvement of the highways described as State aid highways. All moneys appropriated shall remain for the use of the Department until the same is entirely used and applied to the purposes for which it was appropriated.

Local Road Legislation.—General jurisdiction over the roads in each county vests in the county board of commissioners.

In each township three township supervisors of roads shall be elected, one annually, by the electors thereof. Said township supervisors shall divide the township into road districts and employ a road master for each district.

The county commissioners may levy a tax of not to exceed 2 mills on the dollar upon all real and personal property in the county, to improve important county roads.

The township supervisors may levy a road tax of not exceeding 10 mills on the dollar of all property therein. An additional levy of 10 mills on the dollar may be made by order of the court of quarter sessions.

County road and bridge bonds may be issued in an amount not exceeding one-half of 1 per cent of the total assessed valuation of property in the county, provided that not more than one-tenth of 1 per cent of such taxable valuation shall be issued in bonds in any one year.

In 1909 a law was passed providing that all road taxes should be paid in cash, except in townships which, by the majority vote at their annual meeting, shall adopt the system of working out road taxes upon the public highways.³⁴

RHODE ISLAND

State Highway Officials.—The State board of public roads, which was authorized by act passed in 1902, consists of five persons, one from each county in the State to be appointed by the governor, with the advice and consent of the senate, and each to serve for a period of five years. They may be removed by the governor for a cause with the consent of the senate. The members of the board receive a salary of \$1000 each per annum, but are not required to give their entire time to the work.

Duties of State Highway Officials.—The State board of public roads is authorized to expend \$5000 annually for clerical hire, engineers, assistants and incidental expenses. They are required to annually make a report to the general assembly during the month of January, which report shall be accompanied by maps showing present location and grades, proposed location and grades, proposed improvement and probable cost. The report made in January, 1903, was required to present a comprehensive plan of all the main highways of the State which it was thought desirable to improve and the recommendations of the board as to the most desirable period in which to carry on such work.

The board has direct control of the expenditure of all appropriations by the legislature for such road improvement; is authorized to make all contracts, the work done under such contracts to be under the supervision and subject to the approval of the board and in accordance with its plans and specifications. The board

³⁴ Digest, except "Local Road Legislation" prepared by Mr. L. F. Neeffe, Chief clerk, State highway department, January 4, 1912.

reserves to itself the right to reject any or all bids. The successful bidder shall give bond in sum of not less than 50 per cent of the contract price to indemnify the town or city where such road lies, against damage and the State shall not be liable for any damage. Such contracts shall contain forfeiture clauses. The board has supervision over the maintenance of all State roads, and authority to remove any buildings or fences or other obstructions encroaching upon any State road.

Duties of Local Officials.—Any town or city desiring to have a greater width of State highway than 14 feet exclusive of shoulders or gutters, may agree with the State board of public roads for additional width the cost to be paid by such city or town to the general treasurer. Any town or city possessing or having the use of adequate road machinery may bid for contracts and shall have preference over the proposal of any other person for such portion of the main highway as may be within the limits of such town or city, provided their bid does not exceed the lowest bid made by any competitor. Every town or city shall at its own expense keep such State roads within its limits sufficiently clear of snow and ice to render it safe for traveling and shall notify the State board of any defect or want of repair of such roads.

State Aid to Towns.—Each town shall annually appropriate such sum as the electors thereof shall vote necessary for the maintenance of its highways and bridges. Whenever any town shall make such annual appropriation equal to or in addition to the sum of 20 cents on every \$100 of ratable property and whenever the electors shall vote that said appropriation be expended under the direction of the said board of public roads such town shall be entitled to State aid in the care and maintenance of its public highways and bridges other than State highways as follows: A sum of money equal to one-fifth of the money appropriated, as aforesaid, by any town is annually appropriated by the State for the care and maintenance of the public highways and bridges of said towns.

State Road Revenues and Their Distribution.—The cost of all construction and maintenance of State highways is paid by the State. The general treasurer of the State was authorized by an act passed in 1906 to issue State bonds in the amount of \$600,000 for highway purposes, the first \$200,000 to be issued by January 1, 1907, and the balance by January 1, 1908, to be sold for not less than par and to bear 3 per cent interest. Another bond issue of \$600,000 was authorized in 1909, the proceeds to be used in completing the system of State roads under the direction of the State board of public roads. Not more than one-third nor less than one-seventh of the net available appropriation for road improvement in any one year shall be expended in any one county, unless otherwise especially ordered by the general assembly at the

time of making the appropriation. The proceeds of automobile licenses and registry fees and fines are used for the repair of State highways under the direction of the State board of public roads, except the specified amount which is allowed to the board for clerical and other expenses incident to carrying out the provisions of this act.

Automobile Legislation.—Every owner of one or more motor vehicles shall file in the office of State board of public roads a statement under oath of his name, residence, post office address, a brief description of each motor vehicle owned by him, including the name of the maker, number affixed by the maker, the character of the motor power, and such other information as the board may require. The board shall determine the horse-power of each vehicle and the following fees shall be paid to the board for the certificate and license issued by it: for registration of every motor cycle, \$1; commercial motor vehicle and each motor truck, \$2; every automobile of 20-horse power or less, \$5; every automobile over 20-horse power and not over 30-horse power, \$10; every automobile over 30-horse power and not over 40-horse power, \$15; every automobile over 40-horse power, \$25; for the registration of all motor vehicles owned or controlled by manufacturer or dealer, \$50; for each original license or duplicate to operate motor cycle, \$1; for substitution of registration of a motor vehicle previously registered, \$1.

November 7, 1911, the electors of this State authorized the general treasurer to issue \$600,000 in bonds for construction of State highways already on our highway system.

There is no county law in regard to county highways.

The town highways are taken care of by the town officials, some are elected by the people and others appointed by the town councils of the several towns. The money is appropriated in open meeting of the taxpayers held annually.³⁵

SOUTH CAROLINA

Constitutional.—The general assembly shall not have power to authorize any county or township to levy a tax or issue bonds for any purpose except for educational purposes, to build and repair public roads, buildings and bridges, and to maintain and support prisoners (Con. 1895, art. 10, sec. 1).

Statutory.—All roads, highways and ferries that have been laid out or opened by virtue of an act of the general assembly, or of an order of court, or by an order of the county board of commissioners, are declared to be public roads and ferries and to be under

³⁵ Digest revised and approved by Peter J. Lannon, clerk, State board of public roads, December 22, 1911.

the supervision and control of the county board of commissioners and the county supervisor, except in the counties of Bamberg, Bornwell, Beaufort, Charleston, Cherokee, Chester, Hampton and Kershaw. In the eight counties named the township board of commissioners in each township, together with the county supervisor, shall have supervision and control over the public roads in the respective townships (Code 1902, tit. 10, ch. 28, sec. 1349-50).

Each township in the counties not under township organization, except where special legislation provides otherwise, shall constitute a highway district and the supervisor and county board of commissioners of all such counties shall divide the highways in each district into suitable sections, of from two to five miles each, and appoint an overseer for each section. In the counties having township organization the township boards of commissioners, subject to the approval of the county board of commissioners or the supervisors of the county, shall divide their respective districts into suitable road districts and appoint an overseer for each such district (L. 1879, tit. 17, ch. 144; L. 1906, tit. 22, ch. 227).

Taxation.—The county board of commissioners of any county may cause to be levied a road tax, not to exceed 1 mill on the dollar on all taxable property in any township in the county, when so requested by written petition signed by two-thirds of the free holders of such township. Such tax to be collected as other taxes and expended on the highways of such townships (L. 1901, tit. 22, ch. 639).

All male persons able to perform road labor, between the ages of eighteen and fifty years, except those exempt by law and except as varied for certain counties, are required annually to perform or cause to be performed labor on the highways under the direction of the overseer, from two to eight days of ten hours each, as required by the authorities of the respective counties. In lieu of performing such labor upon the public highways a commutation tax of from \$1 to \$3 according to the county, may be paid before the first day of March each year. The commutation tax so collected must be expended by the board of county commissioners upon the public roads in the township from which collected (L. 1900, tit. 23, ch. 638; L. 1904, p. 527, no. 294; L. 1906, no. 80; L. 1907, no. 310).

The township board of assessors of any township are authorized to levy and collect an annual road tax, to supplement any special or other funds for like purposes, upon the written petition or request of at least one-fourth of the resident electors of the township and a like proportion of the resident free-holders of the age of twenty-one years being filed with the county board of commissioners, asking for the same, and stating the rate of tax levy proposed, not exceeding 2 mills; said board of county commissioners

shall then order the township board of assessors to hold an election to ascertain the sense of the voters on the question of levying such tax. Any such electors as return real and personal property for taxation shall be allowed to vote. If a majority of those voting shall vote for such levy the same shall be made and collected as other county and State taxes are (Acts 1904, no. 216).

Width of Roads.—The road beds of all roads heretofore or hereafter laid out shall be not less than 16 feet nor more than 20 feet wide, exclusive of side ditches, ruts and other obstructions, unless otherwise ordered by the county commissioner (L. 1900, tit. 23, ch. 286).

Guide Boards.—Guide boards must be erected at the forks and crossroads by the overseer of each district (L. 1896, tit. 22, ch. 233).

Tires of Vehicles.—All vehicles the tires of which are more than 4 inches broad shall be subject to a toll on all turnpike roads in the State less by 25 per cent than by same vehicles having narrow tires, and vehicles having tires more than 6 inches broad shall be subject to a toll on such roads less by 50 per cent than by vehicles of the same description having tires less than 4 inches. The maximum of tolls established by any law granting charter to turnpike roads shall only have reference to vehicles with tires less than 4 inches broad.

At every 20 miles of turnpike road completed one toll gate may be established with the rates of toll fixed by law, or for every 10 miles of turnpike road completed with one-half the said rates of toll (Gen. Stat., p. 1118-19).

Toll bridges, turnpikes and ferries are chartered by the legislature or the board of county commissioners in the county where located.

Convict Labor.—All able-bodied male convicts shall hereafter be sentenced to hard labor on the public works of the county in which convicted, if such county maintains a chain gang, without regard to length of sentence, and in the alternative to employment in the county jail or State penitentiary at hard labor, provided that in any case the presiding judge shall have power to direct that any person convicted before him be confined in the State penitentiary if it is considered unsafe or unwise for such convict to be committed to the county chain gang; provided, that a separation of the sexes and races be at all times observed, except in the penitentiary and on the State farms, and provided further, should the supervisor or commissioners of any county find that it is inconvenient or impracticable to work any convict committed to the county chain gang he may turn said convict over to the penitentiary authorities (L. 1911, no. 110).

SOUTH DAKOTA

Constitutional.—For the purpose of defraying extraordinary expenses and making public improvements or to meet casual deficits or failure in revenue, the State may contract debts, never to exceed in the aggregate at any one time \$100,000 except to repel invasion, etc.

The debt of any county, city, town, school district, civil township or other subdivision shall never exceed 5 per centum on the assessed valuation of taxable property therein (Con. of 1889, art. 13, sec. 2 and 4).

Local Administration.—General authority and supervision over highways, in counties organized into townships, vests in the township board of supervisors. All construction work, which in any one place or continuous stretch of road shall require an expenditure of less than \$500 shall be done by the township in which such road is situated, under the supervision of the supervisor thereof, said supervisor to advertise for bids and let the same to contract. All road construction, which is in one place or continuous stretch, including bridge approaches and grading same, which shall cost \$500 or more, including surveying fees, shall be done by the county under the supervision of the board of county commissioners, by letting same to contract after due advertisement. The county commissioners in counties of considerable area, which are mountainous, shall employ a practical engineer to superintend the road work of the county and fix his salary.

In counties having unorganized townships all the road work of said unorganized townships shall be under the control of the county commissioners.

Taxation.—Every male resident, over twenty-one and under fifty years of age, except such as are exempt by law, shall be assessed \$2 each year for road and poll tax purposes. The township supervisors shall proceed to estimate and assess such taxes upon real and personal property as is authorized by law and such taxes, when collected, shall constitute a road fund belonging to the township from which collected. All assessments upon persons and property shall be paid in cash, provided that the electors, at the annual town meeting in March, may by a majority vote decide to allow such taxes to be paid in labor at the rate of 20 cents per hour, or 40 cents per hour for man and team.

On the first Tuesday in September the board of county commissioners shall meet at the county seat and levy a road tax, in addition to road taxes levied by the several townships in their counties, which may not exceed 5 mills on the dollar of assessed valuation and they shall have entire supervision of the expenditure of said taxes and, as far as equitable, shall expend said fund for the

benefit of the people of the township from which said tax is received; provided they may levy a higher rate, not to exceed 10 mills on the dollar, if they have been directed to do so by a majority of the electors. Upon petition of 10 per cent of the electors of the county, the county commissioners shall order an election upon the question of levying a greater amount of road taxes than 5 mills for the next fiscal year or a term of years, not exceeding three, to be voted on at the next general election.

In counties having unorganized townships the county board of commissioners is empowered to levy, not to exceed 8 mills on the dollar for any one year, for a road fund, provided said road fund shall be expended in such unorganized district.

Where State lands abut or adjoin a highway which leads directly to markets and where townships or counties have improved the highways to the said State lands, the State commissioner of schools and public lands and the State engineer are authorized to contract with responsible parties for the purpose of continuing said improved highways as far as the State lands are abutting or adjoining on the same and the State shall pay its portion of said road improvements. Said road work shall be under supervision of the State engineer. On completion of the work by the contractor and the approval of the State engineer the said State engineer may issue a voucher for the amount of the contract and the State auditor shall issue a warrant for the same to the contractor, on the general funds of the State.³⁶

TENNESSEE

Administration.—Jurisdiction over the roads vests in the county court. It is the duty of each county court, at its January term each odd year, to divide the county into one or more road districts and elect a road commissioner for each district, to have general supervision over the public highways therein (Shannon's *Code*, 1896, tit. 8, ch. 6, art. 3, sec. 1797-1798; L. 1901, ch. 136).

The county court of each county, at the January term every four years, may elect a board of commissioners, to be known as turnpike commissioners. Said board shall be composed of three persons, the chairman of said county court shall be ex-officio chairman, the other two persons being free-holders of the county, not members of said court. It shall be the duty of said commissioners to look after all turnpikes and toll roads in the county, keep the same in repair, fix the rates of toll and annually make a report to the county court (Shannon's *Code*, 1898, tit. 8, ch. 6, art. 3, sec. 1781-1786).

³⁶ Digest revised and approved by Samuel H. Lea, State engineer, February 6, 1912.

The road commissioner of each district shall appoint, for a term of one year, an overseer for each section of road, as established by the county court (Acts, 1901 ch. 36).

Taxation.—All male residents of the county, between the ages of eighteen and fifty years, except those exempt by law, are subject to road duty. The number of days duty for which each is so liable to be determined by the county court in each county at its January session, but not less than four nor more than eight days shall be required. Said road duty may be discharged by furnishing an able-bodied substitute or by paying 75 cents per day to the commissioner for each day so required (Acts 1903, ch. 572).

The county courts shall levy each year for road purposes on all property in their respective counties, outside incorporated towns and cities, 2 cents on each \$100 valuation for each day assessed to labor on the public roads, provided any person may work out two-thirds of this tax on the public roads in the district wherein said property is situated. Two-thirds of the proceeds of this assessment from any given district shall be expended on the roads therein, under the supervision of the district road commissioners (Acts 1911, ch. 136).

Not less than one-fourth of the entire assessment for county purposes shall be set aside by the county court for road purposes and shall be apportioned equally according to road mileage in the several districts. The county courts shall levy, each year for road purposes, an ad valorem tax on all property in their respective counties outside incorporated towns and cities and tax districts, of not less than 10 nor more than 30 cents on each \$100 (Acts 1903, ch. 572).

Convict Labor.—County convicts may be worked upon the public highways of the county, subject to the direction of the county court (Acts 1903, ch. 572).

Bond Issues.—County bonds, in each particular case, are issued after passage of a special act by the legislature and a vote had thereon by the people, by such vote as the special act may provide.

Bridges.—The county court shall have power to appropriate money for building bridges. Bridges that can not be built by the overseer and his assistants shall be a county charge and the county court shall make a levy on the taxables of the county to raise money for that purpose; said levy not to exceed in any year 20 cents on the \$100. If the county court thinks best the question of constructing such bridge, where the cost is great, may submit the proposition to a vote of the people (Shannon's Code 1896, tit. 8, ch. 4, art. 5, sec. 1707-1716).

State Highway Commission.—A State commission of public roads was created, consisting of three members, appointed by the governor, one from each grand division of the State, for a term of three

years and without compensation. The commission investigates the work of the United States government in the matter of public roads and reports at each session of the general assembly, giving the results of its investigations, together with such recommendations as may be deemed proper (Acts 1909, ch. 561).

(Local organizations have supervision of roads and ferries in different counties, as many counties as are operating under special laws.³⁷)

TEXAS

Constitutional.—The State tax on property, exclusive of the tax necessary to pay the public debt and of the taxes provided for the benefit of public free schools, shall never exceed 35 cents on the dollar of valuation and no county, city or town shall levy more than 25 cents for county or city purposes and not to exceed 15 cents for roads and bridges on the \$100 valuation, except for the payment of debts incurred prior to the adoption of this amendment, other levies are allowed for public buildings, streets, sewers, water-works and other permanent improvements; the legislature may also authorize an additional ad valorem tax to be levied and collected for the further maintenance of the public roads, on the favorable vote therefor of a majority of the qualified property tax-paying voters of the county, such additional tax not to exceed 15 cents on the \$100 valuation (Cons. 1875, art. 8, sec. 9, as amended in 1889).

The legislature shall make provisions for laying out and working public roads, for the building of bridges and for utilizing fines, forfeitures and convict labor for all these purposes (Cons. 1875, art. 16, sec. 24).

The legislature shall make provisions whereby persons convicted of misdemeanor and committed to the county jails in default of payment of fines and costs, shall be required to discharge such fines and costs by manual labor, under such regulations as may be prescribed by law (Cons. 1875, art. 16, sec. 3).

The commissioners court of any county is hereby authorized to issue bonds, or otherwise lend the credit of a county or any political subdivision, or defined district thereof, to an amount not to exceed one-fourth of the assessed real estate values of said county or subdivision, for the purpose of constructing and maintaining gravel, paved, or turnpike roads; provided that such bond issue shall be approved by a two-thirds majority of the qualified property taxpaying voters of said county or subdivision (Cons. 1875, art. 3, sec. 52, as amended in 1903).

³⁷ The foregoing is substantially correct as to general statutory provisions—As you have noted, “many counties—probably a majority”—are operating under special laws.—Cates, *Attorney-General*.

Statutory.—The commissioners court shall classify all public roads in their county into first, second and third class roads, shall act as supervisors of roads in their respective precincts and may, on their own motion, open new roads or straighten existing ones.

The commissioners court shall have full power and authority and may adopt such systems for working, laying out and draining the public roads as may seem best. Each road commissioner shall have control over all road overseers in his precinct (Gen. Laws 1901, ch. 114).

The commissioners court of any county may appoint one road superintendent for such county or one superintendent for each commissioner precinct and said courts are authorized by an order made in any regular term thereof to determine whether there shall be one road superintendent for the county or one for each of the commissioner precincts therein. Such superintendent shall be a qualified voter of the county or the precinct from which he is elected and shall hold office for two years.

The road superintendent, subject to the commissioners court, shall have general supervision over all public roads in his county or precinct and over all county convicts working on the roads.

Each such superintendent shall receive such salary as the court may fix, not exceeding \$1000 a year in counties of less than 15,000 inhabitants, nor \$1200 in counties of more than 15,000 inhabitants. In case precinct superintendents are appointed, each shall receive not exceeding \$300 per year in counties of less than 15,000 inhabitants and not exceeding \$400 in counties of more than 15,000 inhabitants (*Sayles Civil Statutes*, 1906, tit. 97, ch. 6).

The commissioners court of the several counties shall lay off their respective counties into convenient precincts and shall number each precinct and specify the boundaries thereof.

At the first regular term of each year the county commissioners court can appoint a road overseer for each road precinct in the county and shall, at the same time, designate all hands liable to road work and apportion them to the several overseers (*Sayles Civil Statutes*, 1897, tit. 97, ch. 2).

Taxation.—All male persons between the ages of twenty-one and forty-five, not exempt by law, are and shall be liable to work on the public roads not more than five days each year, or commute the same at the rate of \$1 per day.

Upon presentation to the commissioners court of any county of a petition signed by 200 qualified voters, who are property taxpayers in the county, requesting that an election be ordered to determine whether there shall be levied upon the property of said county, by said commissioners court, a road tax not to exceed 15 cents on the \$100 worth of property, under the provisions of the amendment to the constitution adopted in 1890, said court shall

order said election and if a majority of the votes cast are in favor of such tax the same shall be levied by the said commissioners court (Acts 1891, ch. 51 as amended in 1895).

Any county or political subdivision or other defined district of a county, upon a vote of two-thirds majority of the resident property taxpayers voting thereon, who are qualified electors of such county, may issue bonds or otherwise lend its credit in an amount not to exceed one-fourth of the assessed valuation of real property in such county or political subdivision or defined district thereof and to levy and collect taxes to pay the interest on said bonds and create a sinking fund for their redemption at maturity, for the purposes of constructing and maintaining macadamized, gravel and paved roads and turnpikes or in aid thereof.

Each political subdivision or defined district so issuing bonds shall be known as road district _____ of _____ county and such political subdivision or defined district is made a body corporate and may sue and be sued in like manner as counties.

The county commissioner in whose commissioner precinct such political subdivision or defined district may be located shall be ex officio road superintendent of the road district, with power to contract for and in behalf of same up to amount of \$50 only. Beyond that amount, contracts are let by the whole court (L. 1909, ch. 7, extra session).

Ferries and Toll Bridges.—The commissioners court may contract for the building of toll bridges, fixing the tolls to be charged and taking security from the contractor to keep the bridges in repair. The said court may also license ferries and may assess an annual tax of not exceeding \$100 for the privilege of each and every ferry in the county (*Sayles Civil Statutes*, 1897, tit. 97, ch. 8 and 9).

Convict Labor.—The commissioners court may require all male county convicts, not otherwise employed, to labor upon the public highways under such regulations as may be deemed most expedient. Each convict worked on the roads in satisfaction of any fine and cost shall receive a credit thereon of 50 cents for each day he may labor and reasonable commutation of time may be granted as a reward for faithful service and good behavior, provided same shall not exceed one-tenth of the whole time (Acts 1891, p. 149, as amended L. 1901).

Bond Issues.—The county commissioners court of any county in this State is hereby authorized and empowered to issue bonds of said county for the following purposes: For purchasing or constructing bridges for public purposes, within a county or across a stream that constitutes the boundary of a county or for the purpose of improving and maintaining the public roads in the county; provided a proposition for the issuance of such bonds shall have been

first submitted to a vote of the qualified voters, who are property taxpayers of said county, or city, and unless a majority of the said qualified property taxpayers, voting at said election, is in favor of the proposition for the issuance of bonds, then the said bonds shall not be issued. If the proposition for the issuance of bonds be sustained by a majority of the said property taxpayers, voting at said election, then the said bonds shall be authorized and shall be issued by the said commissioners court, or said town or city council (Acts 1903, First Called Session, p. 9, and Acts 1899, p. 258).

These two acts are based on the amended section 9 of article 8 of the constitution, while the act of 1907, chapter 7, extra session, is based on amended section 52 of article 3 of the constitution.³⁸

UTAH

State Highway Officials.—A non-paid State road commission was created by a law enacted in 1909 the said commission to consist of the governor, the State engineer, the State treasurer, one member of the faculty of the Utah Agricultural College selected by its board of trustees, and one faculty member of the University of Utah selected by its board of regents.

Duties of State Highway Officials.—The State road commission shall select the roads which shall comprise the system of State roads; and shall prepare a map of the roads so designated; shall have charge of the expenditures of State road funds; shall furnish plans, specifications, etc., on application of county commissioners; shall prepare a road manual for the guidance of road officials, keep all records in the office of the State engineer for public inspection; and make a biennial report to the governor. The State road commission shall prepare all plans, specifications and estimates of State roads and may let the work of construction to contract. Engineering machinery, apparatus and the force of the mechanics and instructors operating the same at the University and the Agricultural College of Utah shall assist the State road commission without compensation.

Duties of County Officials.—Each board of county commissioners shall biennially appoint a county road commissioner and fix his compensation whose duty it shall be among other things, to assist in constructing State roads under the direction of the State road commission. The county commissioners shall upon application of the State road commission prepare a map showing the location of all county roads and shall designate the most traveled ones. State roads in each county shall be kept in repair by the county.

³⁸ Digest revised and approved by Robt. J. Potts, professor of highway engineering, A. and M. College of Texas, March 26, 1912.

The duties of county commissioners in connection with the apportionment of State aid funds is explained in the paragraph "Road Revenues and their Distribution."

Road Revenues and Their Distribution.—Moneys received by the State from the United States in act of forest reserves shall be applied to the creation of a fund for the benefit of the public schools and public roads of the county or counties in which the said forest reserve is situated, the said fund to be annually apportioned among the said counties.

A State road fund is created by an appropriation from the general revenues of the State, to be available to the county in equal proportions. The State road commission shall require counties of an assessed valuation under \$2,000,000 to duplicate one-fourth of the amount of the State fund available to that county while counties having assessed valuation of \$2,000,000 or more may be required to duplicate the full amount. County commissioners may, however, appropriate any additional sum that they may desire to use in connection with the State fund the same to be expended by the State road commission. Notice of intention to construct a State road in any county shall be filed by the State road commission with the county commissioners by March 1, each year, the county shall notify the said commission of the amount which the county shall furnish for the proposed improvement. If the county commissioners fail to comply, the county forfeits its proportion of its fund for that year.

The county commissioners shall levy a special road tax on all taxable property in any precinct in which the State road commission shall decide to improve a road, said levy not to exceed 5 mills, except when authorized by a majority of property owners. This tax shall not be used in lieu of the amount to be appropriated by the county.

Any moneys which may become available from the National government or from gifts, bequests and donations to the State for road building purposes shall become part of the State road fund.

The proceeds of an automobile license fee of \$2 and a license fee of \$2 for chauffeurs, together with the fines for violations of the said law shall go into the State road fund.

Local Road Administration.—Board of county commissioners has control over public roads and may lay out, alter, abandon, maintain and construct roads.

The board shall appoint a county road commissioner, who shall, under the direction of the board, have charge of the roads of the county, employ competent help, prepare plans, specifications and estimates and, after approval of same by board, shall have charge of construction. He may assist in construction of State roads

under State road commission. He shall make annual written report to the board showing names of persons assessed for road poll tax in each precinct; amount of tax collected; amount of uncollected tax; amount expended in each precinct and description of improvements made; general description of condition of roads; time record of self and assistants.

Road Poll Tax.—Poll tax of \$2 to be paid into county treasury and expended by county commissioners.

Convict Labor.—Jail prisoners may be used under regulations of county commissioners. Prisoners from State prison under less than ten years' sentence may be used under regulations of State board of corrections.

Taxation.—Outside of special road district taxes all county roads of the State are built and maintained from general fund of county. The special road district plan assesses adjacent property owners to one-third of distance from road to boundary of property benefited 50 per cent of cost of improvement; those in the middle third of distance 30 per cent of cost, and those in outer third 20 per cent of cost.³⁹

VERMONT

State Highway Officials.—The governor shall biennially, with the advice and consent of the senate, appoint a State highway commissioner.

Duties of State Highway Commissioner.—The State highway commissioner shall control and direct the expenditure of all moneys appropriated by the State, or apportioned to towns or incorporated villages for highway purposes; and shall annually make rules and regulations for governing such expenditures; and shall issue the same to the town road commissioners with plans and specifications and advice; and he shall also control and supervise the expenditure of all special appropriations made to the towns for highway purposes either by the general assembly or by order of the governor.

The State highway commissioner, with the advice and consent of the governor, shall annually appoint not to exceed one supervisor for each county to assist him in the performance of his duties therein. The selection of the roads by the selectmen and town commissioners for improvement as stated, shall be subject to the approval of the State highway commissioner. And no State money can be expended on any but these "selected highways." All money from the State for the improvement of any road shall be expended by a commissioner appointed by the selectmen with the

³⁹ Digest revised and approved by Mr. Caleb Tanner, secretary, State road commission, January 26, 1912, except Local Digest.

consent and approval of the State highway commissioner, but the selectmen and the State highway commissioner may agree upon any plan of expenditure deemed best in any such town.

The State highway commissioner shall meet the various road and street commissioners of the several towns and villages at least once annually at such time and place as he may direct. The said commissioners shall be entitled to their per diem and necessary expenses for attendance at such meetings. The State highway commissioner shall biennially report to the general assembly the condition of the highways in the State, progress being made on permanent improvements, and recommendations.

The maintenance fund derived from automobile registration shall be expended in the repair and maintenance of main thoroughfares and State roads, under the direction of the State highway commissioner.

Duties of Local Officials.—The selectmen of each town shall select the main thoroughfares and most important roads for improvement under the provisions of this act, and shall submit such selection to the State highway commissioner for approval, but such roads, if approved by the State highway commissioner, shall be known as State roads. The towns shall keep such State roads in good repair at all seasons of the year. All money received from the State shall be expended by a commissioner appointed by the selectmen of each town with the consent and approval of the State highway commissioner, unless the said selectmen and State highway commissioner may agree upon some other plan. A report of such work upon forms furnished by the State highway commissioner shall be made in detail as he may require.

State Road Funds and their Distribution.—A State highway tax of 5 cents on \$100 is annually assessed upon the grand list for the improvement of highways. The State treasurer shall apportion to the towns and unorganized towns such taxes according to their respective grand lists and annually on or before the first day of January transmit to each town treasurer and collector of taxes a notice of the amount so apportioned, and the amount must be collected and paid to the State treasurer on or before June 10 following. The tax so raised shall be reapportioned to the several towns and incorporated villages upon the basis of the total road mileage therein which shall be certified to the State treasurer by the selectmen. The State treasurer shall within twelve days after the receipt of the amount, apportion to each town and incorporated village its portion of such fund on the basis of the ratio of the highway mileage therein to the total road mileage of the State. The State treasurer shall annually on or before the first day of July report to the State highway commissioner the amount apportioned to each town and incorporated village. Any unexpended

balance of a State highway tax remaining in the treasury at the end of any year shall be carried over and reapportioned the following year.

An appropriation of \$150,000 was made in 1910 for permanent road improvement under the provisions of this act, to be available to cities and towns, excluding incorporated villages, as follows: When a town shall vote to raise money in addition to the amount required by law, and shall notify the State highway commissioner on or before April 1 of each year of such action, the State highway commissioner shall apportion to the towns an amount equal to the excess amount so provided by the towns, provided the amount raised by the towns is not less than \$100 or more than \$750 in any one year. The act also provides that an incorporated village may, upon application to the State highway commissioner have the services of an engineer or expert for consultation under the following conditions: A village voting and expending \$500 in any one year on permanent street improvements may have such services at an expense not to exceed \$100 for the biennial term, and if \$1000 is so voted they may have the services and expense not to exceed \$300 for the biennial term.

A town may, with the consent of the State highway commissioner, expend in the first year of a biennial term the full amount of its apportionment. If the selectmen of a town request that work be done by contract, the State highway commissioner may grant such request if he deems it advisable; and in such cases he shall furnish plans and specifications, and all work shall be done to the satisfaction and in accordance with the requirements of the said commissioner.

Automobile Legislation.—Annual registration is required. An application for such registration shall be made to the secretary of State, such application to contain the name and address of the applicant, a brief description of the motor vehicle, including the name of its maker, the number affixed by the maker, the kind of motive power in figures of horsepower, and be accompanied by a fee of \$1 for each horsepower of such motor vehicle. The second registration fee shall be but 75 per cent of the first fee and the third and each successive registration fee shall be but 50 per cent of the first fee. Funds thus derived shall be applied to a separate fund to be called the "maintenance fund," to be expended in the repair and maintenance of main thoroughfares and State roads under the direction of the State highway commissioner in the various counties in proportion to the amounts received therefrom as nearly as possible. A resident of another State or country who has complied with the laws of his own State or country relating to automobiles, shall not be required to pay an automobile registration fee for operating an automobile in the State not to exceed ten days,

provided that such State or country grants a like privilege to the residents of this State. If such person operates such machine in the State more than ten days but not exceeding sixty days, he shall pay a license fee of \$3 for each motor vehicle of 20 horsepower or less; \$6 for each one exceeding 20 and less than 40 horsepower; and \$10 for each one of more than 40 horsepower. If he shall operate an automobile or motor vehicle for more than sixty days, he shall be subject to the same provisions as apply to residents, the amounts already paid to be deducted from the fee required.

The speed limits of automobiles is fixed at not to exceed 25 miles an hour outside of the cities and incorporated villages, and not to exceed 10 miles within incorporated cities or villages, or across any bridge of more than 5 feet span, but the selectmen of towns or officials of cities or incorporated villages may make special regulations on dangerous or narrow roads, which regulations may be appealed to the State highway commissioner.

Local Road Administration.—The county is not known in this State in highway matters. The town is the unit. Each town is assessed 5 per cent on its grand list and that sum is reapportioned to them on a basis of mileage. This naturally makes the larger and wealthy towns contribute to the benefit of the smaller and poorer towns. Beyond this 5 per cent tax, each town is a law unto itself, and may or may not vote additional sums. If it does, it secures the aid of the State to a like amount up to \$750. This aid is from the special State appropriation of \$150,000. From this appropriation there is usually a surplus, which the State commissioner may distribute in his judgment.

Maintenance Fund.—The maintenance fund, created by the fees from the registration of automobiles, is the only other fund and form of taxation. This amounts to, say, \$60,000 per year, and is used to repair the main highways and those that have been improved with State money.⁴⁰

VIRGINIA

State Highway Commission.—A State highway commissioner shall be appointed by the governor, subject to confirmation by the general assembly, for a term of six years, and shall receive a salary of \$3000 a year and actual traveling expenses. The commissioner together with the professors of civil engineering of the University of Virginia, the Virginia Military Institute, and the Virginia Agricultural and Mechanical College and Polytechnical Institute, who shall receive

⁴⁰ Digest revised and approved by Charles W. Gates, State highway commissioner, January 19, 1912.

only their actual expenses, shall constitute the State highway commission. The State highway commissioner shall be a citizen of the State and a civil engineer versed in road building. He shall have an assistant who shall be a civil engineer, and may employ other assistants and clerks as he may deem necessary, subject to the approval of the governor and the other members of the commission.

The State highway commissioner has general supervision over construction and repair of main traveled roads of the State: may recommend to local authorities and to the governor needed improvements in the public roads: shall supply technical information upon road building when requested, and publish such information as may be generally useful for road improvement. He may call into consultation the other members of the State highway commission. He shall also collect information and disseminate the same through farmers' institutes, bulletins of the board of agriculture, or otherwise.

State Aid by Convict Labor.—Whenever the local road authorities of any county propose to permanently improve any main road they may apply to the State highway commissioner for a competent civil engineer to view the said road. If the commissioner be satisfied that the proposed improvement will be permanent and become a main road and that the plans proposed are adequate and practical, he shall cause inspection to be made and prepare plans, specifications and estimates of cost, a copy of which shall be submitted to the local authorities. If the local authorities then decide to improve said road they may apply to the State commissioner for State aid under the provisions of this act, agreeing to supply the necessary materials, tools and teams and to have the work done under the supervision of a civil engineer, to be supplied by the State highway commissioner, at a salary not to exceed \$1200 a year to be paid by the county. The State commissioner may then make requisition on the superintendent of the penitentiary for such number of convicts as he may deem necessary under the plans and specifications agreed upon, and the superintendent shall send to such county the number of the State convict road force so required. The State highway commissioner shall as far as practicable give equal service to each county desiring to accept the benefits of this act.

Persons convicted of crime and sentenced to either hard labor upon the public roads or to imprisonment in jail, and all prisoners sent to jail for nonpayment of fine and costs shall, when delivered upon the order of the superintendent of the penitentiary for such purposes, constitute the State convict road force. Judges of circuit courts and of corporation or hustings courts may sentence convicted persons to work on the State convict road force. Said

convicts shall be returned by the superintendent of the penitentiary to the jails from which they were taken when not needed in the State convict road force. As far as practicable trustees shall be made of the convicts of the State road force. The superintendent of the penitentiary shall provide suitable movable quarters, and shall supply the necessary cooking utensils, beds, wagons, and camp fixtures.

Said road force shall be under the direction and control of a civil engineer appointed by the State highway commissioner, or of a guard or guards designated by the State highway commissioner for the purpose, who shall be well versed in road building. The assistant, clerks, and guards, employed by the superintendent of the State penitentiary shall carry out the orders of the State highway commissioner.

If any county has already entered upon a system of road improvement by convict labor independent of this act, the superintendent of the penitentiary shall continue to supply such county with convicts, and if he fails or refuses to supply convicts to meet the requirements of such county, the governor on application may require him to do so.

An appropriation of \$25,000⁴¹ is made annually as the convict road force fund.

If the local road authorities desire to make permanent improvement by contract and desire the aid of the State convict road force, the State highway commissioner may upon request arrange to supply such county with available convicts not to exceed such number as that, estimating labor at \$1 per day per convict, exclusive of Sundays, will amount to a contribution on the part of the State of more than 40 per cent of the total contract price of such proposed improvement. The convicts so employed shall be under the supervision of the superintendent of the penitentiary and the State highway commissioner.

Felony convicts whose sentences do not exceed five years may be sentenced to hard labor on the public roads.

State Money Aid.—The local road authorities of any county may make application to the State highway commissioner for State money aid, and the same proceedings are had with respect to approval or disapproval as in the case of aid by convict labor, except that in making application the local authorities shall agree that the county will bear one-half of the cost of such permanent improvement. The State highway commissioner shall advertise for bids, and the local authorities shall award contract subject to the approval of the State highway commissioner. If no satisfactory bid is received the local authorities may furnish materials,

⁴¹ Since increased to \$85,000 for 1912 and \$145,000 for 1913.

and construct the road in accordance with plans and specifications not to exceed the cost estimated by the commissioner.

The work shall be done under the actual supervision of the State highway commissioner or an assistant. The expense for such improvement shall be borne, 50 per cent by the State, 50 per cent by the county and smaller divisions thereof, provided that out of the State money aid a sum equal to 5 per cent of the total amount and the amount to be received locally in accordance with this act, shall be made available for the purpose of enabling the State highway commissioner to employ assistants. The State money aid shall be apportioned among all the counties of the State according to the total amount of State taxes paid by the respective counties. In case the funds apportioned are not applied for before March 1, each year, the same shall be apportioned among the counties which have made application for State aid in a sum greater than the amount of their apportionment. Any county which bears more than 50 per cent of the expense of permanent road improvement, after the passage of this act and in accordance with it, shall be entitled to receive its annual apportionment until its receipts from the State shall equal 50 per cent of the cost of such permanent improvements. The county road authorities may determine what part of this 50 per cent of expense shall be borne by the county and what part by the subdivisions of such county.

Counties are not entitled to receive both convict labor aid and money aid in the same year.

Any county in the State may use its apportionment of State money in the construction of bridges.

The sum of \$250,000⁴² annually is appropriated under this act.

Local Road Administration.—The boards of supervisors, of their respective counties, have jurisdiction over all roads and bridges therein. Each county is divided into magisterial districts and a supervisor is elected for each such district. The supervisors from the several magisterial districts constitute the board of county supervisors.

The board of supervisors of each county shall biennially appoint, by a majority vote, a county superintendent of roads, who shall either be a civil engineer or a person versed in road building. The said board of supervisors may, however, in their discretion, appoint such a superintendent of roads for each several magisterial districts of the county, or one for two or more of such districts, and when all such districts are provided with such superintendents, the said supervisors may or may not, in their discretion, appoint a superintendent of roads for the whole county.

The board of supervisors of any county not operating under a

⁴² Appropriations for 1912 and 1913 each \$180,000 and automobile tax.

special road law may divide the county into separate road districts and may call a meeting in each such said district to adopt by-laws and elect officers, to consist of a chairman, a secretary, a treasurer and one or more road surveyors, who shall have charge of the roads of such said district and hold office for one year.

The statute labor has been abolished.

A county road tax of not exceeding 40 cents on each \$100 of real and personal property valuation in the county, not included within the limits of incorporated towns and cities, shall be levied by the county board of supervisors.

Said board of supervisors shall also annually levy a district road tax of not to exceed 40 cents on each \$100 of property valuation in the several magisterial districts of the county, not included in any incorporated cities and towns. Said levy may vary in different districts.

A special subdistrict road tax may be levied, if favored by a majority vote of the free-holders of such said district, which said tax shall not exceed 50 cents on each \$100 of the taxable property therein.

County bonds may be issued on a majority vote of the electors thereof, the amount of such bonds not to exceed 10 per cent of the taxable valuation of all property in the county. Magisterial districts may, in like manner, issue bonds not exceeding 10 per cent of the taxable property therein.

It is also provided (L. 1904, ch. 106, sec. 36) that county bonds may be issued for the purpose of macadamizing or otherwise permanently improving the public roads of said county or building bridges therein, upon a three-fifths vote of the electors of the county therefor, in such a manner that the interest thereon at the rate authorized by the board of supervisors shall not require the imposition of an annual tax in excess of 20 cents on the \$100.⁴³

WASHINGTON

Constitutional.—No counties, cities, towns, school districts or other municipal corporation shall, for any purpose, become indebted in excess of $1\frac{1}{2}$ per cent of its taxable property, without the assent of three-fifths of the voters therein at an election held for that purpose, and then not to exceed 5 per cent on the value of taxable property therein (Art. 8, sec. 6).

Administration.—The unit of administration is the county, jurisdiction over the roads vesting in the boards of county commissioners which have charge of all road work, the levying of taxes for road and bridge purposes, and have supervision over the road supervisors.

⁴³ Digest revised and approved by P. St. J. Wilson, State highway commissioner, April 2, 1912.

The said boards of county commissioners are required to divide their respective counties into suitable road districts not exceeding twenty-four in number and to appoint one road supervisor to have charge of the roads in each district.

Each county commissioner shall be ex-officio road commissioner of the several road districts in his commissioner district of which there are three and shall see that all the orders of the county commissioners therein are carried out.

The county surveyor who shall be a civil engineer and an elector of the county is designated as county engineer, and is elected to office. He shall make surveys, submit estimates, etc., and shall annually inspect all bridges and make a written report to the board of county commissioners with recommendations (L. 1907, p. 351).

The county engineer and the supervisors of the several road districts shall meet with the county commissioners on the first Tuesday of the board's regular session, in April, to outline road improvements to be made (L. 1903, p. 225).

Counties may adopt township organization, in which event the roads in each township shall be in charge of the township road supervisor. Said township supervisors may divide their respective townships into districts and appoint a road overseer for each district (only two counties in the State, however, have township organization) (L. 1911, ch. 34).

Revenues.—County bonds may be issued for road purposes, on election, not exceeding 5 per cent of the taxable property in said county. The county commissioners must ascertain and levy annually the tax necessary to pay the interest on said bonds and create a sinking fund (L. 1890, p. 40-42).

County Road and Bridge Fund.—The board of county commissioners shall annually levy a tax of not more than 4 mills on the dollar of all the taxable property in the county, which shall be payable in money, for the general road and bridge fund.

District Road and Bridge Fund.—The board of county commissioners shall annually levy a tax of not more than 10 mills on the dollar of all taxable property in road districts, which tax shall be payable in money, for the district road and bridge fund (L. 1903, p. 234, sec. 9).

On petition of the owners of two-thirds of the linear feet of land fronting on any county road to the county commissioners, such road may be improved and the cost assessed against the property within one-half mile of said road. The first 880 feet extending back from the road shall be assessed 45 per cent of the whole cost; the second 880 feet 35 per cent of the whole cost, and the third 880 feet 20 per cent of the whole cost.

Automobiles and Motor Vehicles.—A license fee of \$2 is required for each automobile in the State. Non-residents are exempted from this requirement if they have complied with the registration laws of their own State or territory. The speed of automobiles is limited to 12 miles an hour in the thickly settled or business portion of a city or village.

Local authorities are not limited in their power to make, enforce and maintain ordinances governing automobiles or motor vehicles offered for public hire, but they have no such power with reference to those not operated for public hire (L. 1905, ch. 154).

County Convicts.—The sheriff of each county shall employ all male persons sentenced to imprisonment in the county jail thereof, in such manner and at such places within the county as may be directed by the board of county commissioners thereof (L. 1909, ch. 249, sec. 247).

State Convicts.—All convicts confined and not otherwise employed shall be worked, under authority of the State board of control, in the building of State roads. All expenses, of whatsoever nature incurred through such employment, shall be paid from the appropriation by the legislature for the construction of the particular road or roads upon which such convicts may be employed. The place where and the manner in which work shall be performed upon State roads by such convicts shall be designated by the State highway board (L. 1907, p. 173, sec. 1).

State Quarries.—The board of geological survey is directed to ascertain the existence within the State of suitable road-making materials, with a view of establishing State rock quarries, to be operated by convict labor. After their report quarry sites are to be selected by the State highway board and plants established, if the State board of control acquires the said quarry sites.

All convicts maintained at State quarry sites, shall be kept continuously employed in the quarry, crushing and handling the material. All rock so crushed shall be upon the request of the State highway commissioner there delivered to the said highway commissioner and used for the construction and maintenance of State roads. All material so used shall be paid for out of the appropriation made by the legislature for the construction or improvement of the particular road upon which it is used and all material furnished to the State highway commissioner, or to any county, city, town, or other municipality after the requirements of State roads work are met shall be at not less than 10 per cent above the estimated cost of production, at the place of delivery. When the quantity of material on hand is in excess of the amount demanded by the State highway commissioner for use on State roads or for disposition to the counties, cities or towns, then the same may be disposed of by the State highway commissioner at such prices, not less than the cost of production, as he may deem most advan-

tageous to the State, giving prior right of purchase to the citizens of the State. The State highway commissioner may also employ any free labor that may be necessary in the operation of State quarries (L. 1909, p. 810; L. 1911, ch. 114).

All moneys received from the sale of the productions of such quarries shall be paid into the State treasury and to be kept in a fund known as the "quarries rotary fund," for use in operating the said quarries and crushing plants (L. 1911, ch. 114).

The State highway commissioner is authorized to appoint a superintendent of quarries at not more than \$2000 a year, and traveling expenses, removable at the pleasure of the said commissioner. He shall devote his entire time to the management of the various rock quarries of the State. In case there are insufficient funds in the "quarries rotary fund," he shall be paid out of the State highway fund. He shall be subject to the jurisdiction of the State highway commissioner (L. 1911, ch. 114).

For the purpose of equipping the quarries and crushing plants at Selah, Dixie and Marshall, there is appropriated \$100,000 out of the State highway fund. For the purpose of equipping the Meskill rock quarry in Lewis county, \$35,000 is appropriated out of the State highway fund.

Public Highway Fund.—The proper State officers shall levy and collect tax not exceeding one-half mill on all the property in the State, subject to taxation, for the fiscal year beginning March 1, 1911, and for each fiscal year thereafter. The proceeds of such levy shall be placed in the "public highway fund" (L. 1911, ch. 53).

All expenses of the State highway commissioner's office and of the highway board shall be paid out of the "public highway fund" (L. 1905, p. 252; 1909, ch. 186; 1911, ch. 53).

Permanent Highway Law.—The State aid law was repealed in 1911, and a new road law was passed known as the "permanent highway law." This law provides for a tax of 1 mill on all property in the State, the proceeds of which shall be paid into the State treasury and applied to the "permanent highway fund." The amounts received from each county are to be credited to the county paying the same until such time as it shall be expended on contract for permanent highways in such counties; 15 per cent of the cost may be assessed on abutting property and balance paid from "permanent highway fund." When a piece of road is completed under the provisions of this law the highway commissioner is required to inspect the road and certify to the State auditor that the work has been done according to the plans and specifications, to be first approved by him, before the contractor can be paid the final 20 per cent on the contracts (L. 1911, ch. 35).

State Highway Department.—There is hereby created the office of State highway commissioner and a State highway board. The

State highway commissioner shall be appointed by the governor for a period of four years, unless sooner removed for cause. His salary shall be \$5000 a year, traveling and other expenses. A \$10,000 bond is required of him. The State highway board shall be composed of the governor, the auditor, the State treasurer, the State highway commissioner and a member of the State railroad commission, to be named by the governor. Each shall be allowed his actual traveling expenses (L. 1911, ch. 47, sec. 1).

The State highway commissioner shall have an office in the capitol and shall keep a record of all proceedings. He shall prepare and submit, ninety days before the session of each legislature, a report of the work of the year, shall make recommendations as to the needed State highways, with estimated cost thereof. It shall be the duty of the State highway board to apportion the amount of appropriation for any State road which shall be expended within boundaries of the several counties through which it may pass (L. 1909, ch. 186, sec. 2 and 3).

In addition to his other powers and duties the State highway commissioner shall compile statistics and collect information relative to public highways throughout the State. He may be consulted by county officers and shall cooperate with all highway officers and assist county authorities in whatsoever manner he can (L. 1909, ch. 186, sec. 11).

All officers now having or who may hereafter have the supervision of public highways and bridges, shall upon the written request of the State highway commissioner furnish him with all available information (L. 1907, p. 297, sec. 12).

State Roads.—The provisions of the statute relating to State aid roads was repealed by sec. 17, p. 35, Laws of 1911. The "public highway fund" is now expended on State roads upon specific appropriation therefor by the legislature.

WEST VIRGINIA

Jurisdiction over roads vests in the county courts of the respective counties. The said county court of each county may appoint a county road engineer, who should be a practical road builder or civil engineer and shall have charge of the execution of all road work in the county, subject to the county court.

In the event the county court shall not appoint a county road engineer, then it shall appoint a competent man as road supervisor for each magisterial district, who shall, under the direction and control of the county court, divide their respective districts into convenient road precincts not exceeding 10 miles in length and, after due advertisement, let the construction and repair of same to contract.

The county court of each county levies upon all property of the county, taxable for State and county purposes, such taxes as may be necessary for the construction and maintenance of the public roads, provided, however, that in 47 counties the limit of taxation for all county purposes is 30 cents on each \$100 taxable valuation.

A road poll tax of \$1 is assessed against every able-bodied male between the ages of twenty-one and fifty years.

Counties may issue bonds, not exceeding, in the aggregate, 2½ per centum of the value of the taxable property of such county, a three-fifths majority of all votes cast at the election therefor being necessary.

When the county court of any county deems it desirable for any district thereof to appropriate money to construct roads throughout said district, upon the petition of fifty regular voters, who are free-holders of said district, they shall submit the proposition of issuing bonds therefor to the regular voters of said magisterial district and upon a majority vote of three-fifths of the voters of the district, voting upon such proposed bond issue, the county court shall then have authority to issue the bonds, in such amount as voted, not to exceed 2½ per centum of the taxable valuation of said magisterial district.

All State licenses for motor vehicles are issued by the State auditor.

All road taxes are payable in cash.⁴⁴

WISCONSIN

Road Government.—General charge of the roads in the towns is in the hands of the town boards consisting of three members elected annually. These officials divide their towns into a number of road districts (the number varying from 1 to 50) and place a road superintendent or path-master in charge of each district. Up to this time road taxes have been paid in labor in the great majority of towns, but under a new State law county boards were authorized to vote on the method of paying road taxes in their county. More than half the counties voted cash tax.

The new State aid law provides for the selection of a continuous system of roads in each county by its county board. This system is known as "the county system of prospective State aid highways" and these roads may be built by the town, county, and State jointly, each paying one-third of the cost. Bridges over 6 feet in span are paid for two-fifths each by town and county and one-fifth by the State.

⁴⁴ Revised and corrected by Charles P. Light, former State highway commissioner, March 25, 1912.

Improvements on this system are made by a county highway commissioner (selected by the county board) under the general direction of the State highway commission. Counties can pay two-thirds or four-fifths of the cost of work and the State pays one-third or one-fifth just as if towns had petitioned for improvement. After improvement stone or gravel roads and bridges are maintained by the counties. Dirt roads (grading work) done under State aid are still to be maintained by the towns as are the unimproved portions of the system.

State Highway Funds.—The State aid law briefly described above was passed by the legislature of 1911. It appropriates \$350,000 State money annually for road and bridge construction and also \$40,000 annually for engineering and other expenses of the commission. The commission consists of five members who get traveling expenses but no salary. The dean of the college of engineering of the State University and the State geologist are members ex-officio. The three other members are appointed by the governor.⁴⁵

WYOMING

Constitutional.—For State revenue there shall be levied annually a tax not to exceed 4 mills on the dollar, except for the support of State educational and charitable institutions and the payment of the State debt and interest thereon.

For county revenue there shall be levied annually a tax not to exceed 12 mills on the dollar for all purposes, exclusive of State revenue, except for the payment of its debt and the interest thereon. An additional tax of \$2, for each person between the ages of twenty-one and fifty years, shall be levied for county school purposes.

No incorporated city or town shall levy a tax to exceed 8 mills on the dollar in any one year, except for the payment of its public debt and interest thereon (Con. 1889, art. 15, secs. 4-6).

The State shall not, in any manner, create any indebtedness exceeding 1 per cent on the assessed valuation of taxable property therein, except to suppress insurrection or provide for the public defense and no debt in excess of the tax for the current year shall be created unless the same shall have first been submitted to a vote of the people and by them approved.

No county shall, in any manner, create any indebtedness in excess of 2 per cent on the assessed valuation thereof and no debt in excess of the taxes for the current year shall be created by any county or subdivision thereof without the proposition therefor

⁴⁵ Digest prepared by A. R. Hirst, State highway engineer, December 27, 1911.

having first been submitted to a vote of the people and approved by them (Con. 1889, art. 16, sec. 1-4).

Statutory.—All county roads are under the supervision, management and control of the board of county commissioners of the counties wherein they are located. All roads within the State, declared by law to be national, State, territory or county roads, are public highways.

The board of county commissioners of any county may, in its discretion, divide the county into suitable and convenient road districts and the voters of each district shall elect a district road supervisor; and if the county be not divided into road districts, then the voters of the county shall elect a county supervisor, for a term of two years in either county. Said supervisor of roads, whether county or district, shall give bond for the faithful discharge of his duties, shall receive \$3 per day for his services while actually engaged and shall be under the control of the county board of commissioners (Revised Statutes 1899, div. 1, tit. 13, ch. 1, sec. 1906-07, ch. 4, sec. 1972, ch. 2, sec. 1938-42, as amended L. 1901, ch. 90).

Taxation.—The board of county commissioners of any county may levy upon each able-bodied man, between the ages of twenty-one and fifty years, except those exempt by law, a poll or special road tax of \$2 (Ses. L. 1895, ch. 69, as amended L. 1905, ch. 52).

For county revenue of all purposes there is levied annually a tax not to exceed 12 mills on the dollar. From the general fund so collected the county commissioners appropriate money for road purposes.

Convict Labor.—Any convict may be put to work upon the highways and streets (Revised Statutes 1899, div. 5, tit. 5, ch. 9, sec. 5536).

An act was passed (L. 1911, ch. 44) designating certain highways within the State as a system of public highways and providing for their improvement by the labor of prisoners sentenced to the State penitentiary, under the authority and control of the State commission of prison labor. The State commission of prison labor consists of the State board of charities and reform and the State warden of the State penitentiary.

The supervision of the work shall be under such competent persons as may be selected by the said commission and eight hours shall constitute a day's work. Said commission shall adopt rules and regulations for granting privileges to prisoners employed on the highways, with special reference to the granting of additional "good time" allowances in cases of prisoners serving short sentences, and better food for prisoners serving life sentences; such privileges being conditional upon good behavior and efficient work.

All locations and surveys of such highways shall be done under the direction of the State engineer. The boards of county commissioners of the several counties are required to secure the rights-of-way and to construct necessary bridges, in accordance with plans made by the State engineer; provided that, so far as practicable, bridges across small streams shall be constructed by said convict labor. Any material necessary for said bridges shall be paid for by the respective counties wherein the same are located.

In incorporated cities and towns, along said public highways, the municipal authorities shall construct and maintain such highways. The sum of \$10,000 is appropriated for the purpose of purchasing the necessary tools, implements, supplies, equipments and other necessary expenses for the prosecution of the same.⁴⁶

⁴⁶ Digest examined and approved by A. J. Pearsall, State engineer, February 3, 1912.

SUGGESTED STATE AID BILL

Prepared in U. S. Office of Public Roads

An act creating a State highway department, and establishing a State highway commission, and the office of State highway engineer; prescribing the duties of each and fixing the compensation of said State highway Engineer; authorizing State aid for the establishment, construction, maintenance and repair of public highways and bridges; creating a fund and making appropriations therefor; and providing for application by the counties for State aid.

SEC. 1. Be it enacted by the General Assembly of the State of ——— that a State highway commission is hereby established which shall consist of the State geologist, who shall be chairman of said commission, a professor of civil engineering in ——— university, to be selected by the board of trustees of said university, the said professor of civil engineering to be so selected as soon after the passage and approval of this act as may be practicable, and one civilian, to be appointed by the governor within sixty (60) days after the passage of this act, who shall hold office unless removed for cause. All vacancies in the membership of said commission shall be filled in the same manner as is prescribed for the original appointments.

SEC. 2. The members of said State highway commission shall serve without pay, but each member thereof shall be allowed his actual and necessary traveling and other expenses incurred under the provision of this act.

SEC. 3. As soon as practicable after the taking effect of this act, the said State highway commission shall appoint a State highway engineer, who shall be a competent civil engineer, and experienced and skilled in highway construction and maintenance, and who shall receive a salary not to exceed \$———— per annum in the discretion of the commission and shall be allowed his actual traveling and other expenses incurred under the provisions of this act. He shall hold office, unless or until, removed for cause by said State highway commission.

SEC. 4. Said State highway engineer, before entering upon the duties of his office, shall file with the said commission his oath of office with sufficient bond to the State of ——— of not less than \$———— conditioned upon the faithful performance of his duties, said bond to be approved by the said State highway commission, and then filed with the secretary of State.

SEC. 5. The State highway engineer may appoint in his discretion such assistant engineers, clerks and other assistants, as may be necessary to the proper conduct of the work of said commission by and with the advice and consent of said commission.

SEC. 6. The said State highway commission and State highway engineer shall constitute the State highway department, which shall be provided with suitable office rooms in the state buildings at the capitol, which office shall be under the charge of the said State highway engineer and shall be kept open at such times as the business of said department and the convenience or interest of the public shall require. Such office shall be conveniently and properly furnished and shall be the repository for all the records of the said State highway department.

SEC. 7. It shall be the duty of the said State highway commission to hold meetings at such times and for such periods as they may deem essential to the proper carrying out of the provisions of this act.

It shall be the duty of the said State highway commission to consider at their meetings all questions relating to the general policy of the said State highway department, and the conduct of the work in general; to receive and consider at such time as they may select, the annual report of the State highway engineer; and to act for the said State highway department in all matters relating to recommendations, estimates and appropriations and such other matters as it may be found advisable to submit to the governor or the State legislature.

SEC. 8. The State highway engineer shall have charge of all the records of the State highway department; shall keep a record of all proceedings and orders pertaining to the business of his office and of the department; and shall keep on file copies of all plans, specifications and estimates prepared by his office. He shall cause to be made and kept by the State highway department, a general highway plan of the State; and shall collect information and compile statistics relative to the mileage, character, and condition of the highways and bridges in the different counties of the State; and shall, within one year from the passage and approval of this act, prepare a map of such of the main highways in the State, as in his judgment, are of sufficient importance to be designated as a system of trunk or State roads to be improved and maintained at the cost of the State, and report same to the highway commission for submission to the legislature for adoption as a proposed system of trunk or State roads, which, if adopted, or as adopted by the legislature, shall be improved as soon thereafter as possible, under such provisions as the legislature may enact therefor. He shall investigate and determine the methods of road construction best adapted to the various sections of the State, and shall establish

standards for the construction and maintenance of highways in the various counties, giving due regard to the topography, natural conditions, character, and availability of road building material and the ability of the counties to meet their portion of the cost of building and maintaining roads under the provisions of this act. He may at all reasonable times be consulted by county or township officers having authority over highways and bridges, relative to any question involving such highways and bridges, and he may, in like manner, call on such county or township officials for any information or assistance they may render in the performance of his duties with reference to the highways and bridges within their county or township, and it shall be the duty of such county or township officials to supply such information when called upon for same by the said State highway engineer. He shall determine the character and have the general supervision of the construction and repair of all roads improved under the provisions of this act. He shall report all the proceedings of his office to the State highway commission annually at such time as they may designate.

SEC. 9. Whenever the board of county commissioners of any county shall decide that any main traveled road or roads in such county should be improved or constructed under the provisions of this act, they shall make written application to the State highway engineer for State aid in improving the proposed road. If, upon receipt of such application, the State highway commission shall be satisfied, after investigation by the State highway engineer, that the proposed improvement will be permanent and upon a main traveled road, or of public utility and convenience, and that the county shall be able to meet its portion of the cost of such improvement, he may approve same and undertake said work of improvement in accordance with the provisions of this act, and said engineer, or one of his assistants, shall proceed to view said road or part thereof, proposed to be improved, and shall make all surveys, plans, specifications and estimates of cost for its construction out of such materials as may be determined upon by the said State highway engineer.

For improvements to cost \$2000 or less, it shall be discretionary with the State highway engineer, with the approval of the State highway commission, to execute such work of improvement himself, or to allow the county to do the work without competition, or to let the same to contract; but where the cost of the proposed improvement is to exceed \$2000 it shall be the duty of the State highway engineer to advertise for bids to do the work, according to the plans and specifications prepared therefor, in two or more newspapers published or having a circulation in each county in which such proposed highway lies, for a period of three weeks, when such advertisement is in a weekly paper and for fifteen days

when in a daily paper; and such advertisement shall also be published in two or more daily papers of a general circulation throughout the State for a period of fifteen days. Such advertisement shall state the place where the bidder may inspect the plans and specifications, the place where the bids will be received, and the time and place for opening the same. Every such bid shall be accompanied by a certified check of the bidder in an amount equal to 5 per cent of the amount of his bid, which check shall be forfeited to the State highway fund, should the bidder to whom the contract is awarded fail to enter into a contract, as required, within ten days after the notice of such award. The checks of all unsuccessful bidders shall be returned after the contract is awarded and bond given.

All bids so submitted shall be received at the office of the said State highway engineer in ————, and shall be publicly opened and read at the time stated in said advertisement by an employee of the State highway commission, to be designated by the State highway engineer. The commissioners of the county in which said improvement is to be made and for which bids are submitted, shall be notified by the State highway engineer of the time set for opening said bids, and some member of the board of county commissioners may be present at said opening of bids. The said engineer shall have the right to reject any and all bids if, in his opinion, the bids are unbalanced, or any other good cause exists therefor, but otherwise he shall award the contract to the lowest responsible bidder, such award to be subject to the concurrence of the said county commissioners. The successful bidder shall be required to furnish bond, with sureties, in the sum equal to one-half of the amount of the contract awarded, provided no bond shall be required in excess of \$10,000, conditioned that such work shall be performed in accordance with the plans and specifications and the terms of the contract, and no party bidding for the work shall be accepted as surety on the required bond. When the contract is executed by the State highway engineer and the successful bidder, with the written concurrence of the said board of county commissioners, a copy of the same, including the plans, specifications and estimates of cost, shall be forthwith filed in the office of the said State highway engineer, with a like copy furnished to the said board of county commissioners for filing in the county supervisor's office, and a copy to the successful bidder.

SEC. 10. All works of construction and improvement of highways, under the provisions of this act, shall be under the supervision and direction of the State highway engineer, and shall be performed in accordance with the plans, specifications and contracts prepared and executed therefor.

SEC. 11. The total cost of all works of highway construction or improvement under the provisions of this act, shall be paid by the State treasurer, upon the warrant of the State highway engineer, out of the fund hereinafter created for the purposes of this act, the county wherein said work of improvement has been performed to refund to the State one-half of such total cost thereof, when the taxable valuation of such county is \$———— or less, and two-thirds when said taxable valuation is more than \$————. Provided, that in the case of any necessary bridge, including its piers, abutments, wing walls and foundations for same, so constructed on any such highway, under the provisions of this act, the cost of which shall not exceed \$1000, the State shall pay 50 per cent thereof, and where such cost shall exceed \$1000, the State shall pay 50 per cent of the first \$1000 thereof, and 10 per cent of each additional dollar of such cost over and above \$1000; provided, further, that the State shall in no instance, contribute more than \$5000 to the construction of any such bridge in any one county in any one year; and provided, further, that not more than one-third of the proportion of the State highway fund allotted to any one county, in any one year, shall be so used for bridges during such year. The portion of said cost to be borne by the county in which said highway improvement has been made shall be paid to the State treasurer by the treasurer of said county upon the order of said board of county commissioners.

Upon the completion of any such contract for highway improvement, the State highway engineer shall certify to the State treasurer and to the supervisor of the county wherein said work of improvement has been performed, the portion of the cost thereof to be borne by said county or counties, and if the portion of said county or counties, either, or any of them, shall not be paid to the State treasurer within thirty days after being certified by the State highway engineer, then the portion of such county remaining unpaid shall be a charge against any funds of said county which may be in the hands of the State Treasurer, or which may thereafter come into his hands, and the amounts so paid to the State treasurer by the counties, shall be placed to the credit of the State highway fund hereinafter created for the purposes of this act.

SEC. 12. The State highway engineer may authorize partial payments to any contractor performing any highway improvement, under the provisions of this act, as the same progresses. The progress estimates shall be based upon material in place and labor expended thereon, but not more than 85 per cent of the contract price of the work as it is completed shall be paid in advance of the full completion and acceptance of such said improvement. At least 15 per cent of the full contract price of any such work of im-

provement shall be withheld until the work is satisfactorily completed and has been accepted by the said State highway engineer.

SEC. 13. The improvement of roads under the provisions of this act shall be taken up and carried forward in the respective counties of the State, as far as practicable, in the order of the date of receipt of the application therefor, from the commissioners of the respective counties, or as the State highway commission may determine; but no county shall be entitled to receive State aid as provided in this act unless and until it shall first be made to appear to the State highway engineer that the money with which to meet the proportion of said expenses to be borne by the county is either already in the hands of the county treasurer, or will be so in hand, and immediately available upon the completion and acceptance of said work of improvement.

SEC. 14. Every contract for highway improvement authorized to be made by the State highway department, under the provisions of this act, shall be made in the name of the State of Indiana, signed by the State highway engineer and the contracting party, attested by the chief clerk of the State highway department, and approved as to form and legality by the office of the attorney-general of the State. And no such contract for highway improvement shall be entered into by the State highway engineer, nor shall any such work be authorized under the provisions of this act, until the written concurrence therein of the board of commissioners of the county or counties respectively, in which said proposed improvement is to be made agreeing that such county or counties respectively, will assume their proportion of the cost thereof, as hereinbefore provided, shall have been obtained and placed on file in the office of the State highway engineer.

SEC. 15. Whenever any road shall be constructed or improved in any county under the provisions of this act, or has heretofore been so constructed or improved under previous statutes relating to road improvement, under which State aid has been granted, the State highway engineer shall thereafter keep all such roads in proper repair, and the total cost of such maintenance shall be paid by the State treasurer, the said county to reimburse the State its proportional share of such total cost, such payment and reimbursement to be made in like manner and as provided in section 11 hereof for the original cost of such highways. The State treasurer is hereby authorized to pay, upon the warrant of said State highway engineer, such sums as may be required for the repair of such roads.

SEC. 16. No State highway shall be dug up or otherwise used for laying pipe lines, sewers, poles, wires or railways or for other purposes, without the written permit of the State highway engineer, and then only in accordance with the regulations prescribed by

said engineer; and all such work shall be done under the supervision and to the satisfaction of said engineer, and all the cost of replacing the highway in as good condition as previous to its being disturbed shall be paid by the persons to whom, or in whose behalf, such permit was given, or by the person by whom the work was done. In case of immediate necessity therefor, a city or town may dig up such State highway without such permit from said engineer; provided, that in such cases, such highway shall be forthwith replaced in as good condition as before, at the expense of such city or town.

SEC. 17. The State highway engineer, with the approval of the State highway commission, may purchase for the State all rock crushers, steam rollers and other road machinery, tools and implements that may be needed for the purposes of this act and such machinery shall be managed and used under the direction of said engineer, who shall employ competent men to operate and keep them in repair. Said engineer may purchase all necessary materials and supplies and incur such other expenses as may be necessary in the operation, maintenance and transportation of all such road machinery, tools and implements. Upon the application of the board of commissioners of any county, said State highway engineer may furnish such road machinery, when convenient and practicable, for use in building or repairing any road or roads in such county, all expenses incurred thereby to be borne by said county.

SEC. 18. In all cases of a highway constructed under the provisions of this act, the right of way therefor shall be acquired by the county, either by donation by the owners of the land through which such highway shall pass, or by agreement between such owners and the commissioners of such county, or through the exercise by the county board of commissioners of the power of eminent domain, in the same manner as provided for acquiring property for other public uses, and the entire cost of such right of way shall be paid by the county. Any damages that may be sustained by any person by the construction or alteration of any highway under the provisions of this act, shall be investigated and determined by the said board of commissioners, and the State highway engineer, the same to be approved by the State highway commission, and shall be paid by the State treasurer as in case of the original cost of such road, one-half or two-thirds of which amount so paid, shall be refunded to the State, as provided in section 11 hereof.

Any person who may consider himself aggrieved by such determination may, upon petition filed in the circuit court of the county in which said highway lies, within six months after the completion of said highway or alteration thereof, have said damages determined by a jury in the same manner as damages which have been sustained by the taking of land for other public purposes.

SEC. 19. The said engineer, with the approval of the State highway commission, and the concurrence of the said board of commissioners, may vacate any land or part thereof or rights in land which have been taken or acquired for road purposes under the provisions of this act, by executing and recording a deed thereof, and said vacation shall revert the title to the lands or rights so vacated in the persons, their heirs or assigns, in whom it vested at the time of the taking, and may be pleaded in mitigation of, or damages in any suit therefor on account of such taking.

SEC. 20. The said State highway engineer shall have authority to employ any and all labor necessary to carry out the provisions of this act, and shall pay such labor the reasonable and customary price per day for the class of work performed.

SEC. 21. In order to provide funds for carrying out the provisions of this act, the auditor of the State is hereby authorized, in addition to the levy for general state purposes, to levy an annual tax of one-fourth of one mill on every dollar of taxable property in the State, which shall be collected as other State taxes are collected, and paid into the State treasury, and there held as a "State highway fund," for the exclusive uses and purposes of this act; also any moneys accruing from the licensing or registration of automobiles within the State, over and above the necessary expenses incident to such licensing or registration, including salaries of necessary officers and assistants for same, shall be paid into the State treasury and applied to the said "State highway fund," for the exclusive uses and purposes of this act. Any portion of said State highway fund unexpended at the expiration of any fiscal year shall remain in said fund and be available for apportionment and expenditure during succeeding fiscal years.

SEC. 22. The said State highway fund, created hereby, shall be apportioned by the said State highway commission among the various counties of the State in proportion to the ratio that the taxable property in each such county bears to the total taxable property of the State; and not more of said fund than the amount so apportioned to any such county shall be expended therein, in any one year, and then only in accordance with the provisions of this act.

SEC. 23. The term "State highway" as used in this act, shall be construed to include all highways heretofore constructed to which the aid of the State has been extended.

SEC. 24. All acts or parts of acts in conflict with the provisions of this act are hereby repealed.

SEC. 25. This act shall take effect immediately upon its passage and approval by the governor.

ANALYSIS AND EXPLANATION OF SUGGESTED STATE AID BILL

A law providing for State supervision and State aid in road improvement should be so framed as to remove its administration as far as possible from political influences. It is, therefore, provided in sections 1 and 2 that a non-paid State highway commission shall be designated, to consist of a professor of civil engineering from a leading university or college of the State, the State geologist and one civilian member to be appointed by the governor. A commission thus constituted would have a majority of its members selected because of their training and engineering ability and without reference to their political affiliations, which would result in a non-partisan and technically competent commission; while the civilian member to be appointed by the governor would bring to the commission the business ability and experience essential to the proper and economic organization and prosecution of its work. At the same time, so long as the governor could only appoint the minority part of the commission, and the same being non-paid, there would be no inducement at any time to make the position one of political preferment.

The actual work of the State highway department should be under the direction of one man possessing technical qualifications, experience and executive ability; but such person should not be called upon to deal directly with the governor or the legislature in regard to matters of appropriation and general policy, as such work would be semi-political, and could be better done by the commission and with less risk of undue influence being brought to bear upon the department. It is, therefore, provided in section 3 that the State highway commission shall appoint a State highway engineer and shall fix his salary, and that the one so selected shall be a civil engineer and skilled and experienced in road construction and maintenance.

Section 7 provides that the State highway commission shall consider at its meetings all questions relating to the general policy of the State highway department, the conduct of the work in general, and the annual report of the State highway engineer; and that it shall act for the said department in all matters relating to recommendations, estimates and appropriations which may be submitted to the governor or the legislature.

But on the other hand, by sections 5 and 8, the State highway engineer is empowered to appoint all of his assistants, with the advice and consent of the commission, to receive all bids and award contracts, to supervise the work of construction and maintenance, and, in fact, is given full authority in all executive work of the said department, which arrangement seeks to preserve the proper balance of power and give to each branch of the department the duties for which it is best fitted. Section 8 also provides that the State highway engineer shall within one year prepare for submission to the legislature a map of such of the main highways of the State as should most properly constitute a system of State or trunk roads, to be improved entirely at the expense of the State. This is a very essential provision because road improvement should be carried forward with the ultimate idea of developing a continuous system of trunk lines, running throughout the State and connecting, if possible, with similar trunk line roads in adjoining States, with the necessary lateral roads in each county of the State properly improved. This can best be accomplished by having the State adopt such a system of trunk lines as will most nearly meet this need, to be improved and maintained wholly at the expense of the State. The State highway engineer is also given authority to call on county or township road officials for any information concerning the roads under their supervision, and it is made mandatory on such officials to furnish such information when so called upon. This is a very desirable provision, as it is necessary for the State highway department to keep posted as to conditions existing in the different counties throughout the State, and this will be greatly facilitated by requiring the county or township officials to furnish all available information when called upon to do so. At present in most States the township or county officials are very slow about giving information, and there is no authority of law for calling upon them or compelling them to respond when they refuse or neglect to do so.

The initiative in obtaining State aid rests, under section 9, with the county authorities. This is a wise provision, because, in the first place, the county authorities are in better position to know what roads it will be to the greatest advantage of the county to improve, and in the second place, they are best able to determine the extent of the county's ability to share in the expense of such internal improvement. Another consideration of great importance in this connection is that if the initiative were to rest with the State, there would be a certainty of conflict of authority between the State and the counties, resulting in the ultimate failure of the State aid plan, or the practical breaking down of county authority. The only cases in which roads can be built by the State without the full and hearty coöperation of the counties is where the State

pays the entire cost of building State roads. The same section also provides that State aid shall not be granted until the application of the county authorities has been approved by the State highway engineer, which enables the said engineer to exercise a sort of supervisory power over the selection of roads to be improved, to the end that the various roads throughout the State shall conform to a general system of highways which he shall devise. This section further provides that all surveys, plans, specifications, and estimates shall be made by the State highway engineer's office, thereby insuring uniformity and a high degree of accuracy. It is also provided that improvements to cost over \$2000 shall be let to contract, as it has been almost universally found that this means economy, both in time and money, and with proper supervision, will give just as good, if not better, results than could be obtained under any other plan.

Section 10 vests the supervision and direction of all such work of road improvement in the State highway engineer.

It is thought more conducive to the development and general welfare of the State to have a larger proportion of the cost borne by the State in the poorer counties than in the wealthier counties, as this will tend to bring about a better equilibrium, thus enabling the State to move forward uniformly in its efforts at road improvement. Therefore, it is provided in section 11 that the total cost of all work shall be paid in the first instance by the State, the counties to refund a certain portion of such cost when the taxable valuation is above a certain amount, and a smaller portion when the taxable valuation is less than such certain amount. By having the State advance the entire cost in the first instance, the State highway engineer is enabled to prosecute the work through to completion without any delay by reason of non-payment of the county's proportion thereof, while at the same time the State is fully protected by the provision that if the county's portion of said cost shall not be paid within thirty days, it shall be a charge against any funds of said county which may be in the hands of the State treasurer or which may thereafter come into his hands. Necessary bridges along a highway should be regarded as a part of such highway and the State should aid in their construction, within proper limitations, and it is so provided in section 11.

When the work is let to contract, the contractor must of necessity advance money in the performance of his contract, and is, therefore, entitled to receive partial payments thereon as the same progresses. So it is provided in section 12 that the State highway engineer may authorize such partial payments; provided that not more than 85 per cent of the contract price of the work shall be paid in advance of its full completion and acceptance. This arrangement advances sufficient funds to the contractor to enable

him to carry on the work without embarrassment, and at the same time reserves a large enough percentage to afford the State ample protection.

As an additional safeguard to the State in reference to the payment by the counties of their proportion of the cost of such improvement, it is provided in section 14 that all contracts of improvement shall be made in the name of the State, and that no such contract shall be entered into until the counties shall agree in writing, to assume their portion of the cost thereof.

Road maintenance is of as great or even greater importance than road construction, for the reason that the best of roads, if neglected, soon go to ruin. As a rule, county authorities can not be depended upon to properly maintain the roads, if left to their own methods and discretion; so it is provided in section 15 that the State highway engineer shall keep all roads built with the aid of the State in proper repair, the total cost of such repairs to be paid by the State treasurer, the counties to reimburse the State in the same manner and in the same proportions as provided in section 11 for the original cost of such roads.

In order that the State highway engineer may not be hampered in the prosecution of the work of the department by a lack of road machinery, tools, and implements, it is thought best to vest him with authority, subject to the approval of the State highway commission, to purchase such necessary machinery and tools for the State; and it is so provided in section 17.

While each county should be required to furnish the right-of-way for all roads constructed therein, yet any collateral damage which might arise from the acquisition of such right-of-ways or from the construction of such roads should be ascertained and paid by the State and county jointly, in the same manner and in the same proportions as provided in section 11. Section 18 provides accordingly.

Section 21 provides a property tax to raise the funds necessary for the State's participation in such road improvements. If State aid is desirable, it is utterly useless to establish a State aid system without at the same time providing an adequate source of revenue. The levy of _____ of a mill, as provided, will bear very lightly on the individual taxpayers, but will yield an annual fund of \$_____ which will increase as the taxable valuation of property in the State increases. Automobiles are a very destructive agency to roads and hence should contribute in a just and proper way to their construction and maintenance, so it is provided that the proceeds of automobile licenses, over and above the expenses connected with issuing such licenses, shall be applied to the State highway fund and used for the purpose of constructing or maintaining highways.

BENEFITS DERIVED FROM BUILDING GOOD ROADS IN LAUDERDALE COUNTY, MISSISSIPPI

A reporter for *The Meridian Evening Star*, in company with Mr. W. P. Moore, drove out on the Poplar Springs road a few days ago for the purpose of interviewing the property owners and residents living along this road as to their opinion of road improvement after having spent one winter on an improved road, and the following question was asked him:

"As a property owner, a resident and taxpayer on the Poplar Springs road, what is your opinion of road improvement such as you have as an investment to the taxpayers of the county?"

The replies made were as follows:

Mr. T. G. Rainer (an ex-treasurer of this county)—"I have heard compulsory education agitated, but if I was a member of the legislature I would offer a resolution advocating compulsory road construction, for a man that is opposed to it is either ignorant of what it means to him or is a fool, and I think the State ought to look after such people. I get pay over and over every week of my life for what it costs me by watching the school children pass my house to and from school, perfectly comfortable regardless of weather conditions. I am one of the trustees of our school and just a day or two ago I signed the school report, showing a total enrollment of 130 and an average attendance during the month of December of 109. As you know, December was one of the worst months we have ever experienced in this county."

Mr. J. J. Houston—"I have never made an investment for which I have gotten as much financial returns and satisfaction out of as I have out of this road. The advancement in property alone has been sufficient to four or five times pay the whole cost of construction, and I don't think the county could make any investment that would bring in as much returns as to build a network of them all over it. It is such a good thing that I want every man in the county to have one just like it, and I am willing to pay my part of the taxes to help him get it."

Mr. Joe Clark—"I live four miles from the city and two miles from the school. This has been the worst winter that I have ever seen, but there hasn't been a single day that my children haven't walked to school and not a single day have they come home with wet feet; and to think, they walked down the middle of the road not a one of them has been sick with a cold even, while heretofore

my doctor bills have been more than my road tax. Talk to me about paying taxes to build roads. I am willing to pay taxes on my pack of fox hounds, my bird dogs, my chickens, my horses, and if necessary, my wife and children, if they will use it in extending roads like this all over the county. I would rather have my house and ten acres of land on this road like it is now than have my whole farm on the old road like it was before improvement."

Mr. C. W. Schamber (of the firm of Meyer and Schamber, of Meridian)—"The good road has made it possible for me to live at my country home and still attend to my business affairs in Meridian just as easily as though I lived in town. The benefit that strikes me as being most practical and far-reaching is the tremendous increase in real estate values of country property located on the good roads. I have been especially interested in this feature and have found that in every instance I have inquired into farms located on the good road have been enhanced in value from 50 per cent to 100 per cent as a result of the building of the good road."

In contrast to this Mr. Charley Odum, who is a farmer and merchant on the Bonita road, which has not been improved, says: "There hasn't been a time since the first of December that I have been able to get anything hauled to my place from Meridian, just four miles, for less than 25 cents per hundred. In the majority of instances it has cost me as high as 50 cents and a good many times it has been impossible to get it at any price. The people in my community have actually had to go without oil for their lamps for a week at a time because they couldn't get it. If these conditions are not a heavier tax on the people than paying for the construction of roads then I am a bad judge and a bad mathematician."

Lauderdale County has five trunk lines of good roads leading from Meridian and without exception there is hardly a person found who has traveled the good roads, or lives on them, that does not praise them to the skies.

Opinion in general holds that good road building should continue as it is of incalculable benefit to the section through which it runs and is one of the greatest blessings ever devised for the rural resident.

TYPES OF ROADS

Earth Roads

The importance of earth roads is indicated by the fact that of the approximate mileage of 2,200,000 in the United States, 2,000,000 are classed as earth roads. The work in the future upon earth roads should contemplate (1) proper drainage, (2) reduction of grades, (3) improvement of alignment, (4) betterment of the road surface.

Proper Drainage.—The prevailing defect in earth roads is poor drainage and this defect is the first one which should be remedied. Drainage is for two purposes, first to remove water which reaches the surface of the road by precipitation or otherwise and, second, to remove under ground water which reaches the road from adjacent land or through the top surface. Surface drainage is accomplished by securing a reasonably firm crowned traveled roadway and by providing broad shallow ditches of good alignment and uniform grades and with ample outlets. Subdrainage to remove water from beneath the road surface or to prevent its presence in the roadbed is accomplished most effectively by so-called blind drainage or French drains or special sub-side-drains. There are also other methods. These methods include center subdrains or V-shaped drains or sometimes rock bottoming in the form of a rough telford construction. The best side-drains consist of a trench $3\frac{1}{2}$ feet deep, 15 inches wide at the top, in which is laid an open bell joint glazed tile 4 to 6 inches in diameter with the bells up hill and the trench back filled with broken stone or coarse gravel. The main purpose of these drains is to intercept ground water. The joints of the pipes should be left open and the drains should lead into a proper outlet so that the water may go entirely away from the road. One such drain upon the up-hill side of a road will frequently remedy the worst conditions due to the presence of water. The V-drain consists of a shallow V-shaped trench under the entire traveled way which is back filled with field stones or cobbles. Such construction requires considerable excavation but is somewhat cheaper than two side-drains. The excavation must be 12 to 18 inches deep at the center and 6 to 8 inches deep at the edges. It should be back filled with stones ranging from 6 to 10 inches in diameter with the largest in the bottom. To dispose of water collected by this drain, trenches should be dug about every 50 feet and back

filled with stone. These trenches should lead entirely away from the road so it is seen that this construction is mainly available for either roads located over fills on boggy land or on side-hills when the outlets will of course be on the down hill side only. Sub-drainage should not be undertaken without proper lines and grades furnished by an engineer as it is expensive and if properly put in would constitute sufficient drainage for any subsequent improvement of the road by macadamizing or otherwise.

Returning to the matter of surface drainage, the earth road should be kept free from ruts by the use of the road drag or otherwise and a crown of 1 inch to the foot should be preserved. Water is thus shed toward the sides. The side ditches collect surface water and must be kept free. On heavy grades they will tend to wash and may require paving in the worst cases. The wash may usually be prevented by providing sufficient outlets to reduce the volume of water. A common defect in earth roads is failure to provide side-drains to discharge water away from the roads. Surface drainage is greatly hampered and interfered with by drive-ways leading into private grounds. Raised drive-ways across open gutters divert the water into the center of the road and unfortunately in most instances where tiled drains have been placed, they have become broken or clogged and every considerable rain storm threatens the destruction of a portion of the roadway. The only point where such a drive-way is safe is at the top of a grade. Even when drive-ways are provided with under drains it is common to find that the drainage of the drive-way itself runs into the road. Surface drainage then upon earth roads demands fearless treatment of the drive-way problem. It would probably pay in most instances to pave the bottom of the gutter where the drive-way crosses it and leave the side drainage free.

When it becomes necessary that drainage water cross the road, ample culverts must be provided. The worst fault common to culverts is that they rapidly become clogged with leaves or other rubbish. They should therefore be of more than sufficient size in the first instance. When less than from 2 to 3 feet of earth cover tile pipe, it is liable to become broken. The prevalent defect on earth road construction in the matter of culverts is that they are too small and too near the surface. It will pay even in earth road construction to install more expensive culverts in the first instance rather than to rip them up for repairs at frequent intervals.

Grade and Alignment.—The worst grade on any road is the effective limitation of traffic. After a grade exceeds a rise of 6 feet in the hundred it is serious. Grades may be avoided or reduced either by relocation in part or by excavation and embankment. The best treatment of earth roads in the matter of grades is to

establish once and for all a definite, permanent grade with the engineer's level. It need not follow that the entire road is to be graded but with the grade line in mind the worst hills may be cut down and the worst hollows filled up and year by year the entire road will progress toward a final and satisfactory profile. Much money has been wasted by not adopting such a grade line at the outset. In the matter of relocation it is, of course, impossible for a road well established in the community to be entirely changed or abolished in most cases. Grade improvement may have to be brought about by relocating smaller portions of earth roads. Here, again, the services of a surveyor or experienced road supervisor with a transit will prove economical in the end. Some necessary relocation may be undertaken each year. In reducing grades or relocating for earth roads, it is not necessary that all cuts and fills should balance as excess of material may always be used to widen fills and a deficiency of material can usually be supplied by widening the cuts. In the matter of roads over rocks or ledges, it is cheaper to fill up hollows with borrowed earth than to undertake excessive rock cutting. In constructing or repairing an earth road, it is quite common to use the scraping grader or road machine. Where work with this machine is undertaken the width of the road between gutters should be determined. It is a common fault to find earth roads too wide. Twenty-four feet between gutter lines is ample for a road which a community is not warranted in improving by macadamizing or otherwise hardening its surface. Frequently 20 or 18 feet is a sufficient width. With the width between gutters in mind, a line of stakes should be set before the grader begins its work. The line of stakes along each gutter will improve the work of the grader and leave gutters which will not tend to cause wash into the road.

Surface Betterment.—When it is desired to spread new material upon an earth road care should be taken to secure it from the best available supply. It is not good practice to place gravel in patches upon an earth road to fill hollows. Materials should be spread uniformly upon the traveled way and should be applied for a considerable distance and the ends of the application should be reduced in depth gradually so as not to form a new chuck hole. The object of the scraping grader is to simultaneously construct gutters or side-drains and place material for a crown in the center.

Right here is opportunity for a great improvement in earth road work. Sod, leaves, vegetable matter and rotted material of any description can never form a road surface. There are two ways of using the grader. It may be operated at first to cut the surface only and scrape all perishable material into ridges which are later carted away or the grader may be run regardless of sod and other poor material and men with rakes and forks can then

follow it and remove all objectionable matter into dump wagons. Old roads are frequently in such condition that it is better to scrape the shoulders and gutters away from the center and remove the entire mass. Frequently this operation alone will result in a well established and crowned roadway with live material for its surface.

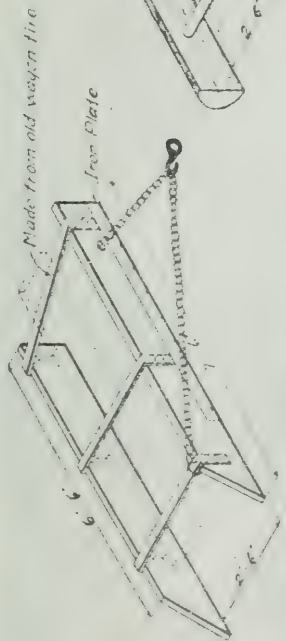
Conclusion.—The earth road problem today is a problem of repair and maintenance. No earth road will endure travel without constant care. The use of the split-log drag which is described in the paragraph upon maintenance is the best method for preserving road surfaces and establishing proper surface drainage from the traveled way to the side ditches. Earth road repairs will become unnecessary in proportion to the increased care in road maintenance. It cannot, however, be expected to start any maintenance upon an earth road until it is put in reasonable repair. The repair should follow the lines indicated above, that is to say, earth road repair should include some permanent drainage work, the reduction of some of the worst grades, the straightening of bad curves and the betterment of the road surface by the removal of worn out and objectionable material.

Sand-Clay Roads

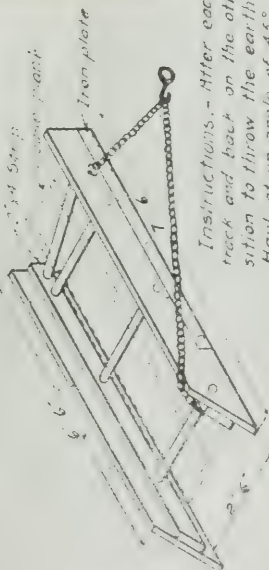
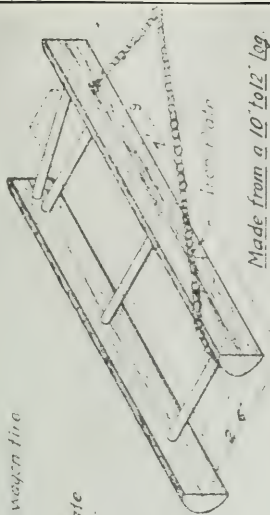
A sand-clay road is composed of sand and clay mixed in such proportions as to form a compact and firm support to traffic. The perfect sand-clay road should be neither sticky nor sandy. The sand and clay may form a natural mixture, in which case the road is termed a "natural sand-clay road." The two materials may have become mixed in the fields along the road by successive cultivation of soil, and this soil known as "top soil" is sometimes used in road construction.

There are many varieties of both sand and clay, consequently there is a wide variation in the characteristics of a sand-clay road. Sand while one of the hardest minerals known, possesses practically no binding or cementing power. The grains of sand instead of cohering in a tough mass under the impact of traffic and the action of water, remain loose and shifting. No road is so difficult to travel as the road located through fine sand, and the difficulties are enormously increased when high winds prevail.

Clay is a decomposition product of the mineral feldspar. If the clay has been carried by water the deposit is known as "sedimentary clay." If the feldspathic rock has disintegrated in place, the product is known as "residual clay." The sedimentary clays are in general more sticky and plastic than the residual clays. In contrast with sand, which possesses no binding power but is very hard, clay is a powerful binder, but does not possess the quality of hardness. It is evident that in the construction of a sand-clay



Cut from a 2" x 12" - 14" Plank.



Instructions.— After each round, dive up one side of the wheel track and back on the other side at least once, with drag in position to throw the earth to the center side on the drag haul at an angle of 45°.

Gradually widen the strip dragged as the road improves. To round up the road better, plow a shallow furrow occasionally each side of the dragged strip, and work the loose dirt to the center.

road the sand must furnish the quality of hardness and resistance to wear while the clay must furnish the quality of toughness and bind the individual sand grains firmly together.

The theory of the sand-clay road is very similar to the theory of the macadam road. In the latter, rock dust and screenings fill the voids between the angular fragments of stone and when wet serve as a cement or binder. The grains of sand may be likened to the angular fragments of stone and clay to the rock dust binder. In the most successful sand-clay road, just a sufficient amount of clay is used to fill the voids between the grains of sand. In this way, the sand sustains the wear, while the clay serves as a binder. If too much sand is used, the result will be loose sand on the surface; if too much clay is used, the surface of the road will become sticky after rains.

The best mixture of sand and clay can be made when the materials are wet, and particularly is this true of the "ball clays." The more water that is used, the better the mixture, and if practicable, the materials should be puddled. A disk harrow may be used to advantage.

The extent to which the mixing can be carried on will depend largely upon the character of the clay. If it is a very plastic clay, much greater effort will be necessary to obtain a complete mixture; if, on the other hand, it is a slaking clay, the mixing will be much less difficult. Slaking clays are not as satisfactory, however, as the ball clay, as their binding powers are much less. In selecting clay for road purposes, it is always best to select the stickiest clay available. A common test is to wet the thumb and place it against a piece of clay. If the clay sticks to the thumb, it is reasonable to suppose that it will stick to the sand; if it will not stick to the thumb, it is safe to assume that it will be a poor binder in a sand-clay road.

If the clay is placed on sand to a depth of 6 inches, a cubic yard of clay will cover 54 square feet, consequently a 16-foot road treated in this manner would require about 1 cubic yard of clay for each 3 feet of length. A mile of 16-foot road would, therefore, require 1760 cubic yards of clay. The amount that can be hauled by the average team varies from two-thirds to 1 cubic yard, according to the character of the road over which the hauling is done.

If the clay sub-soil is to be treated with sand, it should be plowed and harrowed to a depth of about 4 inches. On this prepared sub-surface should be placed from 6 to 8 inches of clean sand, spread thickest at the center and sloping to the sides in much the same manner as the clay is applied to a sand road. These materials should then be mixed dry instead of the wet mixing, which is preferable when clay is applied to sand. This is preferable, because the clay can be better pulverized when in a dry state. After the

dry mixing, the road should be heavily sprinkled or should be puddled after the first heavy rain. After the materials are thoroughly mixed and puddled, a road machine or grader should be used to give proper crown to the road, and if a roller is available the road can be improved by the use of it. As it is impossible to determine exactly the proportions of sand and clay to be used in the first place, it is necessary to give careful attention to the sand-clay road for a considerable time after it is completed, in order that additional sand or clay may be applied as needed.

Gravel Roads

There are three important qualities which should be possessed by road-building gravel—hardness, toughness, and cementing or binding power. Of these three qualities, the last is the most important. This binding quality is due in part to the presence of oxide of iron, lime, or clay, and in part to the angular shape and size of the pebbles composing the gravel. Blue gravel is generally conceded to be the best for road construction, because it is usually derived from trap rock. As the pebbles composing the gravel retain the characteristics which they formerly possessed as a part of the larger rock itself, it follows that as trap rock is considered an excellent material for road building, trap rock gravel should occupy the same relative rank among the gravels. Quartz possesses practically no binding power, although it is very hard. Therefore, gravel which contains an exceptionally large percentage of quartz will not prove successful, as it will fail to consolidate unless it contains binding material, or unless a good binder is added. This, however, is not true of the chert gravels which bind and consolidate very well forming excellent roads.

The shape and size of the pebbles composing the gravel have an important bearing upon its value as a road material. In order that the material may bond readily, the pebbles should be angular and should vary in size so that the smaller fragments may fill the voids between the larger pieces. Gravel obtained from streams is usually inferior to pit gravel for the reason that the action of the water has worn the pebbles smooth and practically all the fine binding material has been removed by the same agency. Even if clay or loam is mixed with river or creek gravel, the result is not likely to be as satisfactory as that obtained by the use of pit gravel. Pit gravel frequently contains too much clay or earthy matter, while river gravel may have too much sand. In such cases it is advisable to screen the gravel so as to eliminate the material which is too fine and that which is too coarse. The screen should be similar to that which is used in preparing material for a macadam road. In the handling of the gravel care should be exercised not

to separate the binding material from it, nor should this binding material be allowed to settle to the bottom in spreading the material over the road surface. It will often be found advisable to spread a thin layer of such binding material over the surface after the material has been distributed and rolled, and after this the surface should be sprinkled and rolled again, or else rolled while still damp from the rains.

When the gravel, especially that which is to constitute the surface layer, contains large pebbles, these should be removed and either thrown aside or else raked into the foundation or recrushed. At least 60 per cent by weight of the gravel should be pebbles above one-eighth inch in size, and there should be no pebbles in the bottom layer that will not pass through a $2\frac{1}{4}$ -inch or 3-inch ring, and in the top layer there should be no pebbles which will not pass through a $1\frac{1}{2}$ -inch ring. Not over 20 per cent of the mass should be clay, and this should be uniformly mixed and should contain no large lumps. Ten or 15 per cent of clay produces better results than 20 per cent. If the foundation or road bed is loose, it should be carefully rolled. It is quite as important to have a solid foundation for a gravel road as for a macadam road. Gravel will compact to about 80 per cent of its depth, loose measure. If the compacted depth of the gravel road is to be 8 inches and the width 12 feet, it will take about 2250 cubic yards of gravel to the mile, and it is best to make the first layer about 6-inches in depth, loose measure, and the second layer about 4-inches in depth, loose measure.

Gravel should not be dumped directly on the road, as this will usually result in a rough, uneven surface. A carefully staked out sub-grade or "box" with earth shoulders is necessary. The sub-grade should be rolled. If specially devised spreading wagons are not used, the gravel should be dumped on boards and spread from them on to the road. The gravel should be placed on the road commencing at the end nearest the gravel pit in order that the teams may aid in packing the material.

Each layer of gravel should be rolled separately with a power roller; the rolling should begin at the sides and continue toward the center until the surface is thoroughly compacted. The surface layer should be sprinkled while the rolling is in progress, but if a roller and sprinkler are not available, the road should be constructed during the wet season of the year, as the rains will cause the material to pack much better than if the road were built during the dry season.

The split-log drag, or some similar device, can be used to advantage in maintaining gravel roads but it will be necessary to use hand rakes to remove excessively large stones which appear on the surface. New gravel must be uniformly spread from time to time.

Macadam Roads

The macadam road takes its name from John L. Macadam, whose biography appears in this volume. The word *macadam* denotes a surfacing composed of angular broken stone bound together, whose voids are filled with stone screenings flushed with water, and which is consolidated by rolling, into a practically impervious crust, superposed on a thoroughly compacted foundation or subgrade. Both the exposed surface and the subgrade have a crown or slope from center to sides.

A good macadam road should have (1) proper location, (2) easy grades, (3) perfect drainage, (4) firm subgrade or foundation, (5) broken stone with good wearing and bonding properties and (6) careful inspection during the construction. Proper location and easy grades are more essential for macadam roads than for less expensive types of roads for the reason that unless right at the outset they cannot be changed without extraordinary expense.

Perfect Drainage.—Drainage must remove water from the road surface and the foundation and carry it entirely away from the road. The properly completed macadam surface sheds water into broad open side ditches by virtue of the road crown. The side ditches may have to be paved upon steep grades especially where they carry considerable water from adjacent land. When ditch water must cross the road, catch basins are usually necessary and ample culverts should be provided of first class construction (see article on culverts). To drain the road foundation or subsoil, side-drains with tiled pipe and stone back fill are most effective. Where considerable field stone is present a shallow so-called V-drain forming the entire subgrade is cheaper than two side-drains and equally effective in providing sub-drainage. The V-drain filled with stone not greater than from 8 to 10 inches in diameter with the larger stones at the bottom, should be brought to the true crown and rolled and it should have frequent outlets entirely away from the road. When properly built, the V-drain offers an excellent foundation for the macadam surface. In particularly damp or boggy spots a telford foundation or bottoming course of hand laid stone not less than 6 inches in depth is sometimes used. Modern practice, however, seems to favor either the sub-side-drain or the V-drain construction for drainage purposes. Sub-drainage is usually required in heavy cuts on hillside roads and for roads over swampy land.

Subgrade.—After a road has been properly graded and the permanent drainage structures completed, the subgrade must be built. In cuts through firm soil, the subgrade is formed by simply excavating a trench of width and depth equal to the width and depth of the compacted stone surfacing. Spongy material wherever

encountered must be removed and replaced by good live earth or gravel. Where loose dry sand is encountered, the utmost care is necessary to prevent the sand from churning into the first layer of broken stone when rolling commences. In fills if the earth has been deposited in layers and subjected to teaming, the subgrade trench or box may be excavated and afterwards thoroughly rolled. Care must be taken to insure that the subgrade is thoroughly solid and it must not wave under the roller. Material excavated from the subgrade is piled along the sides or shoulders to form earth abutments to prevent spreading of the macadam when it is rolled. Too much care and refinement cannot be given to the subgrade or foundation for the macadam. It should invariably be rolled to a true firm surface, clean and without ruts and with perfect crown. There will then be no waste of stone or churning of earth into the lower course to weaken the macadam and the tendency of the finished road to form holes will be largely avoided.

Broken Stone.—Trap rock is the best road stone for plain macadam or "waterbound" macadam construction. It is frequently desirable, however, to use local stone and the Office of Public Roads, U. S. Department of Agriculture, will test stone samples from any locality in this country free of charge. This Office has published complete tables showing the relative merits of nearly all road stones. Road stone should (1) be hard enough to wear well, (2) so tough that the roller does not crush it, (3) and possess bonding qualities to form a smooth unyielding surface. Road stone is usually placed in two courses; the first course ordinarily consists of stones varying in size from 3 to $1\frac{1}{2}$ inches in greatest diameter. The softer stones may be somewhat larger than the denser or tougher material. Ordinarily a roller cannot compact more than 6 inches of loose stone successfully and it is customary for the first course to be rolled separately. The stone is spread either from spreader wagons or from dumping boards. Careless dumping of the stone directly upon the subgrade in piles will result in an uneven finished surface. The first course is sometimes called the no. 1 stone. It is thoroughly rolled with a steam roller until walking does not loosen the stones. Teams hauling stone over the subgrade should guard against cutting ruts or churning the stone in the subgrade soil. Upon the rolled first course, a second course of stone varying in size from $1\frac{1}{2}$ to $\frac{3}{4}$ inches in diameter is placed to a depth of about 3 to 5 inches in a manner similar to the first course. When the second course stone has been rolled until its surface is smooth and the individual stones are well keyed together and no creeping or wavering appear before the front wheel of the roller, the bonding process commences.

Careful Inspection.—Bonding of a macadam road is accomplished by completely filling the voids in the broken stone with fines or

screenings from the crusher. The best practice requires that these screenings be from the same stone as is used in the top course. The process of binding or bonding requires the greatest care. The fines or screenings or stone dust should be worked in the road *gradually*. To accomplish this, the screenings are spread in thin successive courses with alternate wetting by a sprinkling wagon and continuous rolling. Care should be taken that wagons drawing screenings should not cut up the partially built road. When the voids are completely filled mud will flush to the surface in front of the roller and the bonding is complete. If the macadam is well bonded, the road is now strong enough to withstand the kick of a boot-heel.

The width and depth of macadamized surfaces are governed by local conditions. A one-way road may be as narrow as 8 feet. The general practice is to build macadam surface from 14 to 16 feet in width. The thickness of the macadam surface is determined somewhat by the traffic conditions and varies from 5 to 8 inches when complete. Loose broken stone is usually estimated to consolidate about one-third under rolling.

A newly built or green macadam road will sometimes immediately show tendency to ravel particularly if the second course stone is trap rock. This raveling usually cures itself but if it continued, removal of the larger loose stones and additional rolling may be necessary.

Bituminous Macadam Roads

The term "bituminous macadam"⁴⁷ was introduced about the year 1906 to designate a macadam road, for which some form of bituminous material was used as a binding agent and to form a surface coat. The desirability of changing from the original type of what is now called "waterbound macadam" was brought about unquestionably by the action of increasing automobile traffic. When the presence of automobiles of various types and speeds became general on macadam roads, it was found (1) that more or less dust was raised from the surface by the passing automobile

⁴⁷ In justice to those who claim that the term "Bituminous Macadam" should be used in a much more restricted sense the following definition from the Report of the Sub-Committee on Bituminous Paving Nomenclature of the American Society of Municipal Improvements is given.

(3) Bituminous macadam is a pavement consisting principally of crushed stone and retains its integrity of structure mainly by the mutual support of the various particles of stone, aided by the slight bonding value of the fine mineral matter in its composition, and which is protected from surface disturbances by an upper bonding layer of bituminous material. It is a one-layer pavement and there is no definite distinction to be made between the wearing surface and the base, as in their nature they must be knit together in one structure. Practically all the horizontal stability, as well as vertical

and that this dust usually was carried away from the road; (2) that the surface of the dry macadam road soon raveled and in the worst conditions completely disintegrated; (3) that it was too expensive to water macadam roads sufficiently to prevent the formation of dust and the consequent destructive effect of excessive automobile traffic.

A bituminous macadam road does not differ from the original macadam construction until the process of binding begins. It has been found, however, that the former desirable qualities in road stones, such as hardness, toughness, and cementing qualities, do not play so important a rôle as formerly when the stone in question is to be treated with bituminous material. If we assume then the construction of a macadam road to have progressed through the stages of proper drainage, grading and consolidation of the subgrade, we then place the first course of No. 1 stone upon the rolled subgrade, as formerly. This no. 1 stone is still laid in the same standard sizes ranging from $2\frac{1}{2}$ to $1\frac{1}{4}$ inches in diameter. After this course has been thoroughly rolled to consolidated thickness, say from 3 to 5 inches, the no. 2 course is then applied. There are two well defined methods for applying this course.

Mixing Method.—No. 2 stone varying in diameter from $1\frac{1}{4}$ to $\frac{1}{2}$ inch is cleaned and dried. It is then mixed with sufficient quantity of bituminous material to thoroughly coat all the pieces. This may be done by hand labor upon a mixing board, or by raking stones through a bath of the bituminous liquid, or otherwise. The practice of using mixing machines similar to concrete mixers is increasing and with the better types of machines results are satisfactory and the cost is reduced. Practice has shown that it requires in the neighborhood of $1\frac{1}{2}$ gallons of bituminous material per square yard of finished surface, so that if a second course were spread 3 inches thick loose, a cubic yard of stone would require about 18 gallons of bituminous material. After the coated stone has been put in place, a thin layer of clean, sharp fines (from which the best practice demands the removal of the dust) is spread lightly and the course is then rolled with a steam roller. Wherever an excess of bitumen appears on the surface, more fines should be added and

support, is from the macadam base. The pavement may be produced by adding the bituminous top to the macadam base by either the penetration method or the mixing method. In the former the bitumen is applied in a liquid state and a top dressing of stone or sand is spread over the surface and thoroughly rolled. In the latter the bitumen is mixed with the mineral, consisting of comparatively fine stone or sand, or a mixture of both, and forced into the macadam body of the pavement by rolling. In either case, whether the penetration or mixing method is followed, the macadam base must be specially prepared, with voids in the upper portion into which the bitumen or bituminous mixture penetrates leaving a coating of the desired thickness over the surface.

rolled. After rolling is completed, all surplus fines and dust should be swept from the surface. A seal coat or paint coat or finishing coat of bituminous material to insure waterproofing and complete filling of the voids is now applied. This consists of a uniform application of about one-half gallon to the square yard of surface. Screenings or fines are again applied and the road may or may not be rolled.

Penetration Method.—By the penetration method, the second or no. 2 course of stone is put in place and partly rolled with a steam roller. The bituminous material is then applied either by hand from pouring pots or by some modified hose nozzle leading from a tank cart or by a mechanical distributor. Material for hand spreading is usually brought to the job in barrels; when a tank cart is used, it is generally filled from a tank car at the siding. Bituminous material is heated usually by steam from a steam roller, but when hand pots are used, the material is heated with kettles over fires. The application is about $1\frac{1}{2}$ gallons to the square yard and the object is to penetrate the second course to a considerable depth. It is now considered good practice to apply the bituminous material under pressure from a hose fitted with a proper nozzle to spread the material in a finely subdivided stream, or spray. The object is to secure better penetration and more uniform distribution over the road stones. After the distribution of bituminous material, a light coating of sharp, clean fines or screenings or sometimes sand or clean gravel is applied and rolling progresses. A paint coat of about one-half gallon to the square yard is usually applied, followed by a coat of screenings to complete the construction.

The above description presents a bold outline of bituminous construction and it must be understood that various modifications in processes are practiced, e.g., the no. 1 course may be bound with screenings or no. 2 course may also be partly bound with screenings, even with the use of a sprinkler and subsequent drying of the road. Some engineers prefer to apply the stone without screening into separate sizes with the object of securing the reduction of the voids by the use of crusher run stone. Other engineers have seen fit to use no. 1 stone as the second course. The practice of spreading the broken stone in sizes and then thoroughly mixing by harrow or otherwise, is not uncommon. It is clearly evident that the final standardization of bituminous construction has not yet been reached. In round figures, the cost of bituminous macadam runs about 25 to 40 cents per square yard in excess of ordinary "waterbound" macadam.

Some engineers contend that an ordinary plain macadam construction, followed by a thorough paint coat, is the most desirable form, but this is essentially surface treatment.

A system introduced in England by Arthur Gladwell, now known as the Gladwell system of bituminous road construction, requires the spreading of a mixture of sand and bituminous material or fines and bituminous material over the top of the no. 1 or first course of macadam followed by a no. 2 course of clean, dry stone and a second layer of mixed fines and bituminous material. The three layers are then rolled with a steam roller. The object of this form of construction is to secure a thorough filling of the second course of stone by the mixture of fines and bituminous material from both above and below.

Throughout this description the term "bituminous material" has been used as a generic term and should be read to include all forms of artificial binders which are in common use.

The details of the management of bituminous material are extremely important. It is known that a proper selection of the bituminous binder is vital to the success of construction. Standard specifications for bituminous material are not yet in complete agreement. There are certain chemical tests which it is known that good bituminous material should satisfy. It is quite possible that these chemical tests have not yet developed final form and that additional physical tests should be introduced to enable proper selection of material. For further details as to matter of pressure, temperature, viscosity, etc., the reader is referred to articles upon bituminous road materials.

Brick Roads

Vitrified paving brick have been in use in this country a little more than thirty-five years as a wearing surface for streets and highways. In their early history little attention was given to using them in the most advantageous way, either as to durability or as to the possible satisfaction in their use. It was rather a commingling of varied ideas with a good material, with no definite realization of what is really possible in a brick street constructed under the most approved methods of today.

Vitrified paving brick are manufactured from the less refractory fire clays and shales which are found in almost all of the bituminous bearing deposits throughout the United States. No two deposits of these shales or clays are exactly alike; they do not burn alike either in color or in the amount of heat required to bring them into the best condition adaptable for their use, so that the raw material must receive slightly different treatment at each of the factories. On this account brick of different manufacture differ in appearance.

A brick burned sufficiently to develop the best quality from any one of the clays and shales used is almost impervious; at least sufficiently so that the amount of moisture absorbed, regardless of

temperature, does not affect the brick in any way. The adhesion of the particles is brought about by sufficient heat to bring them into a molten state. The process has brought into a new use the work "vitrified" and in connection with the manufacture of paving brick that word is given a new meaning. It does not mean that perfect vitrification is obtained as in the manufacture of glass, but an approach to it, forming a coalescent body.

In the use of vitrified brick for a wearing surface, due consideration must be given to the amount and character of the traffic in determining the width of the road and the character of construction. The amount of money possible to expend must also have due weight. The available local ingredients which may be used in the construction of the road in addition to the brick, must also be taken carefully into consideration. For example, it is necessary to determine whether concrete shall be used as foundation, and, if so, of what the concrete shall consist, or whether there shall be any artificial foundation at all. The question of whether the road is to be located in the northern portion of the country subject to extreme climatic conditions or in the extreme south where low temperature need not be guarded against is of great importance. The question of drainage also enters materially into the problem.

The type of the road therefore must be influenced by some one or more or even all of the foregoing, as every feature to a greater or less extent bears a particular relation to the economy of the road itself. To illustrate: the black mucky soil of somewhat difficult drainage of northern Illinois where practically all of the thoroughfares are subject to a traffic of numerous and heavily loaded vehicles, and subject also to extremes of low temperature and liable to consequent damage from frost, require the best and more expensive type of roads. In and about the Gulf Coast where the soil for the most part carries a large proportion of sand and is not subject to frost action economical roads can be built without any artificial foundation at all by merely preparing the grade to correspond with that of the finished highway. The requirements for these two types of roads as to local conditions to a very large degree equalizes the cost in respective localities. For instance, in northern Illinois the brick on account of freight rates are slightly less in cost and the material, such as gravel and broken stone, which enter into the foundation are of low cost so that a road built in northern Illinois corresponds in price to the road equally adapted to conditions found in the South and this state of affairs very largely obtains throughout the country, so that the cost of adaptable types is not materially different.

As to the different types and kinds they may be approximated as follows: the best and most expensive type that shall meet sever-

est conditions as well as severest traffic must be made with a carefully drained and thoroughly compacted subgrade, the surface of which shall be made to exactly conform with that of the finished highway. Upon this subgrade must be placed a concrete base finished with a smooth surface and from 4 to 6 inches in depth. On this base a compressed sand cushion to a uniform depth of two inches is placed. Upon this 2-inch sand cushion must be placed the brick with the best edge up. These bricks after being so placed must be rolled and ironed out so that the plane presented by the surface shall be entirely free from any depressions. Following this condition the interstices shall be completely filled with a mixture in uniform preparation of 1 to 1 of sand and portland cement. Provisions shall also be made along either curb for contraction and expansion. The details for installation of this work may be obtained from the National Paving Brick Manufacturers Association by a request for the same addressed to their headquarters in Cleveland, Ohio. The cheapest and least expensive type eliminates from the foregoing the foundation of concrete and even cement filler so that a road in the sandy districts can be made based upon the expenses of the brick, the curb and the preparation of the grade. Intermediate conditions necessarily obtain here and there throughout the country where with good judgment economy may be greatly subserved in the manner and method of building with due consideration of the traffic to which the roads respectively are to be subjected. Let it be thoroughly understood that the highest and best type is not only satisfactory and sanitary but of the greatest durability. However, the cheaper type is oftentimes advisable because of lower first cost and traffic requirements. The maintenance cost of a well constructed brick road is small and its advocates claim that this cost is negligible.

Concrete Roads

Types.—Three distinct types of what may be properly called concrete roads have been used in the improvement of important heavy traveled public highways: (1) One and two-course concrete roads; (2) Concrete cube roads; (3) Concrete roads with wearing surface of bitumen and sand.

Materials.—The materials required in the construction of this type of roadway are Portland cement, a fine and coarse aggregate, water, and a suitable bitumen, where a wearing surface of bitumen and sand is to be used.

The cement should meet the requirements of the standard specifications for Portland cement of the American Society for Testing Materials.

Fine aggregate should consist of sand, crushed stone or gravel screenings graded in size from fine material to that passing when dry, a screen having $\frac{1}{4}$ -inch holes. It should preferably be silicious material, clean, coarse, free from dust, soft particles, loam, vegetable or other deleterious matter and not more than 3 per cent should pass a sieve having 100 meshes per linear inch. For a fine aggregate in the wearing surface, use stone screenings from granite, trap or other close grained, hard, durable rock, graded in size from $\frac{1}{2}$ inch to the finest permissible.

The coarse aggregate should consist of clean hard durable inert materials, such as crushed stone or gravel, graded in size from the maximum permissible to that retained on a screen having $\frac{1}{4}$ -inch holes. The maximum size of coarse aggregate for use in the construction of a two-course pavement should be such as to pass a $1\frac{1}{2}$ -inch ring and for one-course pavement not over 1-inch material.

Water should be clean, free from oil, acid, alkalies and vegetable matter. Where a wearing surface of bitumen and sand has been used, a specially distilled coal tar has been found to give the most satisfactory results.

Equipment.—In addition to the usual equipment needed in the preparation of the subgrade or foundation for all types of roadways, for the construction of a concrete roadway, there will be required a good concrete mixer preferably of the batch type provided with traction power and a swinging boom and bucket from which the concrete can be deposited in place, a sufficient amount of 2-inch lumber for side forms, a set of forms for constructing expansion joints, wheelbarrows, shovels, the finishing and other small tools owned by every contractor doing concrete work and some means for hauling materials.

On large work, on long hauls or in districts where men and teams are scarce, hauling with traction engines has been found to be most economical, and the comparatively large amount of water required can probably be best obtained from the nearest source of supply by pumping through small metal pipe lines with small gasoline engines, rather than by hauling in tank wagons with teams.

Foundation.—The subgrade or foundation upon which concrete is to be laid should be brought to a firm unyielding surface by rolling, and all soft, spongy or yielding spots and all vegetable or perishable matter should be entirely removed from the subgrade and the space refilled with gravel, broken stone or other suitable material. Special attention should be paid to drainage and water must be kept from reaching the foundation after the road is laid by means of open ditches or tile drains, provided with suitable outlets. In the great majority of cases the concrete can be laid directly upon the properly prepared subgrade but in exceptional cases a sub-base of from 4 inches to 6 inches of gravel, broken stone,

or other suitable material should be used. Old macadam or gravel roadways make ideal foundations upon which to lay concrete.

Expansion joints.—To provide for expansion and contraction concrete roadways, except type no. 2, should be laid in sections not over 25 feet long with a $\frac{3}{8}$ -inch to $\frac{1}{2}$ -inch expansion joint between sections running perpendicular to the center line of the roadway. All expansion joints should extend through the entire thickness of the pavement and should be filled with an elastic waterproof filler that will not become soft and run out in hot weather, or hard and brittle and chip out in cold weather. For first class-construction the edges of all expansion joints should be protected with suitable metal angle iron or plates, but where not so protected, the edges of the concrete at expansion joints should be neatly rounded to a radius of about $\frac{1}{4}$ inch.

Crown.—A concrete roadway should be given a crown at the center of not less than $\frac{1}{100}$ or more than $\frac{1}{175}$ the total width of the pavement. Instead of being crowned the roadway may be sloped in one direction in which case the slope per foot should not exceed the above requirements.

Two-course roadway.— Upon a properly prepared subgrade should be laid at least $4\frac{1}{2}$ inches of properly proportioned well mixed concrete base. The concrete should be mixed in the proportion of one sack of cement to not more than 3 cubic feet of fine aggregate and not more than 5 cubic feet of coarse aggregate. The concrete should be mixed as wet as is practicable, and should be placed as soon after mixing as possible but in no case should more than thirty minutes elapse between the mixing and the placing of the concrete base. The concrete base should be deposited in strips extending across the full width of the area paved and should be well tamped to a surface the thickness of the wearing surface below the finished surface of the roadway.

The concrete base before it begins to harden should be covered with a wearing surface at least 1 inch thick composed of 1 sack of cement and not more than 2 cubic feet of suitable fine aggregate. A mortar consisting of one part cement and 2 parts of a mixture of three parts $\frac{1}{4}$ -inch to $\frac{1}{2}$ -inch crushed granite and two parts $\frac{1}{4}$ -inch granite screenings free from dust makes a first class wearing surface.

The wearing surface should be placed as soon as it is mixed and in no case should more than forty-five minutes elapse between the mixing of the concrete base and the covering of same with the wearing surface.

The wearing surface should be finished with a wood float and before it has completely hardened should be slightly roughened by brushing with a stiff brush or broom.

One-course roadway.—Upon a properly prepared subgrade should be deposited at least 6 inches of concrete mixed 1 sack of cement,

not more than 2 cubic feet of fine aggregate and 3 cubic feet of $\frac{1}{4}$ -inch to 1-inch screened gravel or crushed stone from a close grained durable rock.

The concrete should be mixed and placed and the surface finished as described for two-course pavement.

Concrete cube roadway.—Two-inch concrete cubes have been used during the past three years in Monroe County, N. Y., for surfacing old macadam roads. The cubes are cast in gang molds or made in a machine making 68 cubes at one operation. With the machine a foreman and seven men could make about 26,000 cubes per day, and the same gang could easily fill the molds for 30,000 cubes in a day. The concrete for the machine made cubes should be mixed rather dry with $\frac{1}{2}$ -inch gravel, while for the cubes cast in molds a wetter mixture and larger aggregate should be used. The mixture used averaged about 2.2 barrels of cement per cubic yard of gravel concrete.

Remove all loose material from the surface and level by applying a thin layer of screened gravel, well rolled to an even surface with the required crown. Lay the cube on this foundation close together without attempting to break joints or lay in regular courses or rows. Then spread a small amount of fine, somewhat loamy gravel over the surface of the cubes, broom it in the joints and roll the surface. Additional fine loamy gravel should be spread, broomed, and flushed in until the space between the cubes are thoroughly filled and the cubes rolled to a solid bearing.

Concrete roadway with wearing surface of bitumen and sand.—When a wearing surface of bitumen and sand is used upon a concrete roadway, it should be placed upon one-course of concrete at least 6 inches in thickness composed of one sack of cement to not more than 2 cubic feet of fine aggregate and 4 cubic feet of coarse aggregate. This should be constructed as described for one-course roadway.

After the concrete has hardened for at least seven days, the clean dry surface should be covered with hot bitumen applied with sprinkling cans or from a sprinkler wagon designed for the purpose. After applying the hot bitumen it should be immediately evenly distributed over the concrete by brushing with a suitable broom and covered with clean coarse sand. Between one-third and one-half gallon of bitumen should be applied per square yard of pavement and a cubic yard of sand will cover approximately 150 square yards of surface. Before applying the wearing surface all expansion joints should be filled as described under the heading Expansion Joints. Where a wearing surface of bitumen and sand is used the edges of expansion joints need not be protected with metal.

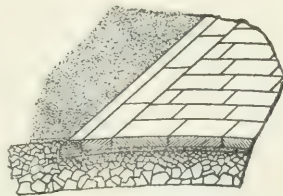
Asphalt Blocks on Country Roads

As designed and manufactured for use on country roads, the asphalt blocks are 5 inches wide, 12 inches long, and 2 inches deep, weigh about eleven pounds each, and have a specific gravity of about 2.5.

The asphalt block was developed and perfected on the theory that crushed trap rock, on account of its preëminent hardness and inherent grittiness, made the best known material for a roadway surface, the one thing needed being a cement, or binding material, to keep all of the particles permanently in place. This was accomplished by the use of an asphaltic cement to bind together the properly graded particles of crushed trap, the hot mixture being consolidated by tremendous pressure into blocks so dense and free from voids as to be practically non-absorbent. In the asphalt block, therefore, we have an asphaltic concrete, or macadam, mixed, in exact proportions, at a great central plant, under conditions insuring absolute uniformity, and receiving the compression necessary to produce a dense and non-absorbent material.

Not only has a special block been produced, but a special method of construction has been worked out, designed to utilize what is left of the worn and rutted macadam road as a foundation for the blocks. This is accomplished by scarifying the surface, if necessary, filling up the deep ruts, rolling with a heavy steam roller, and laying upon the surface of the old macadam, a bed of cement mortar about 1 inch in thickness, to serve the double purpose of forming a firm unyielding bed for the blocks, and binding them securely to the macadam foundation underneath. By this method the material used in the original construction of the road is not thrown away, but used as foundation for a permanent wearing surface. Where the old macadam is too thin, or too badly worn to be safely used as a foundation, it will be necessary to lay a concrete base, but usually there is broken stone enough in the old macadam to supply what is needed for laying concrete.

A pavement may be laid of any desired width, contour, grade, or crown. It is perfectly feasible to pave one-half of the roadway, or only a narrow strip in the center, and extend the paved area at a later date as traffic necessities require, or as appropriations become available. It is not necessary to set curbstones or heading stones to border or define the paved area, since a row of stretcher blocks held firmly in place by a shoulder of mortar, as shown in the sketch, answers the purpose perfectly and leaves the entire roadway surface smooth and uniform.



A good example of this construction is on the Albany Post Road, through the villages of Hastings-on-Hudson, North Tarrytown and the Town of Mount Pleasant, N. Y.

Patented Methods of Road Construction

Under date of March 25 a letter was sent by the secretary of the American Association for Highway Improvement to all manufacturers of road materials asking that they submit description of any patented methods of road construction which they thought should properly be included in this chapter. The information contained herein is based upon the replies received.

Bitulithic Pavement.—This pavement is laid under several patents, the basic principle United States patent being no. 727,505, issued to the late Frederick John Warren. The scope of the patent, as given in the opinion in Warren Brothers Company vs. Owosso, Michigan, written by Mr. Justice Lurton, then Presiding Justice of the United States Circuit Court of Appeals, Sixth Circuit, is as follows:

Warren's invention, shortly stated, consists in the discovery that an aggregate of large and small pieces of stone, together with a certain proportion of stone dust, all mixed together and thoroughly permeated with bitumen or asphalt, results, when set, in a compact, stable structure, is less liable to disintegrate from traffic or weather than any other method of grading or arranging the mineral constituents. Under the evidence, the particles are more compact in their relation to each other and there is a minimum of friction in their interaction. The larger pieces of stone withstand the tendency of the small grains or dust to slip by each other and change the form of the pavement by disintegration and lumpy spots. The result is, therefore, a stability due to the arrangement of the mineral structure which enables the use of a softer asphalt or bitumen than would be otherwise feasible, inasmuch as a greater proportion of the wear and strain is carried by the mineral elements than by the binding constituent.

The Bitulithic surface may be laid on any suitable substantial foundation, such as macadam, new or old; crushed stone properly compressed; concrete, either new or resurfacing foundations of old pavements; old brick; granite block or cobble stones. Bitulithic surface is described by the owners of the patents as follows:

Surface: Upon the foundation is spread the wearing surface which is compressed with a heavy road roller to a thickness of 2 inches. The surface mixture is made of the best stone obtainable, varying in size from a maximum of 1 inch or 1½ inches down to an impalpable powder, the various sizes of smaller stone, sand and impalpable powder being provided to fill the spaces between the larger stones. The proportions used of the various sizes of mineral are pre-determined by physical tests with a view to obtaining the smallest percentage of air spaces or voids in the mineral mixture, and vary with the character and shape of particles of the stone used in each particular case. After the proportions have been determined,

the mineral material is passed through a rotary dryer, from which it is carried up an elevator and through a rotary screen which separates the mineral material into its several different groups of sizes. The proper proportion by weight of each of these sizes is secured by the use of a scale having seven beams, the exact required amount being weighed out, and run into a double shaft rotary mixer. There it is combined with a bituminous cement which is also accurately weighed in the proper portion. The whole is then thoroughly mixed together and dumped, while still hot, into carts, hauled to the street and spread and thoroughly rolled with heavy steam road rollers.

Grit Surface: After the surface is thoroughly rolled, a flush coat of quick drying bituminous cement is applied to the surface, thoroughly sealing it and increasing its waterproofness. There is then applied a thin layer of finely crushed stone, varying from $\frac{1}{4}$ -inch to $\frac{3}{4}$ of an inch in size, according to the roughness of the surface desired. The pavement is again thoroughly rolled, leaving the street in a finished condition.

Warrenite Road.—Warrenite Road is a modification of Bitulithic pavement adapted to meet the traffic conditions which exist on country highways.

Bitustone Double Bond Roadway.—This is laid under United States patent no. 1,001,695 issued to August E. Schutte of Northboro, Mass., on August 29, 1911. The construction is briefly described by the eighth claim of the patent, as follows:

A pavement for foot or vehicular traffic, comprising a mineral aggregate the particles of which are in substantial contact and are otherwise surrounded and bonded together by a rigid non-liquefiable cement, the voids between the bonded mineral particles being filled with elastic cement.

The total depth of the construction recommended by the patentee is 5 inches, as follows:

1. *Foundation or Bottom Course;* of ordinary Portland cement concrete, the mineral aggregate of which may be either crushed stone, gravel, slag or other suitable material.

2. *Bonding Course;* of hard stone or gravel, of nearly uniform size, varying from about 1 inch to $\frac{1}{2}$ inch mixed with neat Portland cement in the proportion of one part cement to six parts stone. The bonding course is tamped and well embedded into the mortar of the foundation or bottom course.

3. *Filler;* after the bonding course is thoroughly set, presenting particles of crushed stone strongly united with neat Portland cement, but containing large percentage of voids between the individual particles, hot bituminous cement especially prepared for the purpose, is flushed over and penetrates into the spaces of the bonding course, and while the cement is still hot the whole surface is covered with fine crusher screenings or coarse sand.

ROAD MAINTENANCE AND REPAIR

Repair of all kinds of roads should take place before maintenance is begun. Too often the terms maintenance and repair are confused. If the maintenance of a road is neglected, it will be necessary eventually to repair it. A well maintained road, on the other hand, may never require repair.

The repair of earth and gravel roads usually involves reshaping and drainage and the subsequent betterment of the road surface. Special items of repair are replacing, culverts, refilling washed portions of the road, excavating new ditches, etc. The repair of gravel and earth roads is well explained in the article on construction of the same.

To distinguish the repair of macadam roads from the maintenance of the same, the word repair may be restricted to those operations commonly called resurfacing. When an old macadam is worn so thin or becomes so full of chuck holes that its life is endangered, it is usually resurfaced. It is becoming increasingly common to resurface macadam roads with some form of bituminous construction. If the old macadam surface is first scarified or picked up with the roller or hand labor, and considerable new stone added the repair operations go forward from this point as in bituminous macadam construction. When no bituminous material is used in macadam road repairs, the surface stone is brought to true crown and thoroughly rolled and bonded as in ordinary macadam road construction. There is considerable variation in the method and amount of scarifying or loosening of the old macadam surface; e.g., if a macadam road has simply developed a horse track or worn travelled way for a width of 6 to 8 feet in the center, the road is sometimes repaired by thoroughly sweeping and adding sufficient new stone to restore the crown without scarifying. Sometimes the edges only of a macadam roadway are scarified or picked to insure a bond of new stone with the old road course. Scarifying or picking up of the old road surface may be entirely omitted and new stone put in place without disturbing the road crust. This should never be done without first thoroughly scouring the old surface with stiff brooms and flushing with hose, if possible, otherwise a dust layer will be present and no bond develops between the new and old material. Of course, if a hose cannot be had, thorough dousing with a sprinkling cart will suffice.

Many macadam roads are now repaired by what is now known as surface treatment. This is essentially a modified form of bitu-

minous construction by the penetration method. A typical example of this process is as follows: The old road is thoroughly cleaned of all dust and refuse; and application of bituminous material is made on the road of $\frac{1}{4}$ gallon to the square yard followed by a uniform coating of screenings or fines, preferably of screened trap rock. These screenings should not exceed $\frac{1}{2}$ inch in greatest diameter. If ruts or holes are present, they may be brought up to a true surface with screenings. The road is now rolled; another application of $\frac{1}{4}$ gallon to the square yard of bituminous material is made and the second course of screenings applied. Such depressions as developed are of course filled with screenings as the work proceeds and a sufficient excess of bituminous material should be given to such spots. A supply of surface screenings should be left along the road when such repair methods are used so that they may be spread subsequently to take up any excess of bituminous material that develops on the surface.

Maintenance

Undoubtedly the best system of maintenance is that which provides for the permanent and sometimes continuous employment of skilled laborers who have charge of particular sections of road, or who may be assigned to any part of the county or other road unit where there is work most needed. Men employed in this way become experts in their particular line and if they make mistakes one year or in one place, they are apt to correct them but, under the labor tax system, mistakes are often repeated. If one man is employed to look after a particular stretch of road, he will learn to take pride and interest in his work.

The continuous maintenance system has been adopted in this country only to a limited extent. It has been used by the Massachusetts highway commission for several years. The New York State highway commission introduced it in the year 1910 for the maintenance of State roads, and Allegheny County, Pennsylvania, employs it for the maintenance of about 100 miles of county roads.

While it would be manifestly impossible to adopt the continuous maintenance system throughout the country on account of limited resources, and sparse population, still there are many places where it might be used with success. It would be difficult to find a county which is so poor that it could not afford to employ continuously eight or ten laborers and three or four teams to maintain and repair its roads. That such a plan would be more effective than the labor tax system has been often proved.

Never allow a rut or hole to remain on the road, but fill it at once with chips from the stone heap, and where automobile traffic is heavy bind the patches with some artificial binder. In fact it is

now doubtful practice to patch macadam roads at all without using some artificial binder. One or two automobiles a day passing a loose patch will frequently destroy it. When the road is built, the contractor should be required to place at least 100 tons of surface material and screenings at a convenient place for each mile of road constructed. Avoid applying stone more than one stone deep; add a second layer when the first is worn in. Never crack stones in the road. Trap rocks, granites and other hard stone should be broken finer for repair work than the limestones and other softer rocks.

Use clean screenings for binding together newly laid material. Road sweepings, horse droppings, sods and other rubbish if used for this purpose will ruin the best road ever constructed. Water-worn, or rounded stones, should not be used for repairs, as they will not bind. Never allow dust, or mud to lie on the surface of a macadam or gravel road, for either of these will increase the cost of maintenance. If possible roll macadam roads with a steam roller after the frost is out of the ground in the spring.

The caretaker, or patrolman, should always be on his road particularly in wet weather, and should fill up at once with fine stone or screenings any holes or ruts where the water may lie. If these holes are filled with dirt, this should be removed before the screenings are applied. Loose stones are a source of danger and annoyance, and should never be allowed to lie on any road particularly where there is automobile traffic.

The causes of wear on hard roads are the weather, the wheels of vehicles, the action of automobiles and horses' shoes. The weather always acts to some extent directly on the materials, but to a greater degree indirectly. Frost is a most active agent. The expansion and contraction caused by frost sometimes leads to a general distintegration of the surface. This is especially true where clay is used as a binder, and where the road surface is porous, or the drainage poor. When such a road thaws out after a hard freeze, the macadam or gravel will sometimes become a layer of loose stones, into which the traffic will cut and form ruts. Frost has but little, if any, effect on a dry, well-kept road.

Look after the drainage very carefully in the fall, and be sure that the surface is as nearly water-proof as possible, so that the road will go into the winter dry and not full of water. Violent rains often wash out the binder and sometimes the smaller stones as well, leaving the surface both rough and porous. The amount of material lost from the road by this means is often larger than the toll exacted by traffic.

Of all our roads, the earth roads are probably the most neglected. The first and last principle in the maintenance of earth roads is to keep the road well drained. Water is the great enemy to our

clay or soil roads, and must be removed immediately, or mud results. To insure good drainage, the ditches must be free and the smooth crown of the road maintained. For this purpose the split-log drag, or some similar device is very useful and, at the same time, inexpensive. The drag can be used on a sand-clay road or gravel road with good effect.

The following points govern dragging on earth, gravel or sand-clay roads: The drag should be light, and should be hauled over the road at an angle of about 45 degrees so that only a small amount of earth is pushed to the center of the road. The driver should ride on the drag and not drive faster than a walk. Dragging should begin on the side of the road, or wheel track and return on the opposite side. Unless a road is already in good condition, it should be dragged after every heavy rain, when the mud will puddle well, and still not adhere to the drag. A few trips over the road will give the operator a clue as to the proper and best time to drag. If a road is dragged immediately before a cold spell, it will freeze smooth.

Always drag a little earth toward the center to keep the slope of the crown about an inch to the foot. If the drag cuts too much, shorten the hitch or change your position on the drag. The results from dragging are obtained only by repeated applications. A good system of dragging is that which is practiced in Kansas and Iowa, where road authorities are authorized to let contracts to farmers for dragging the roads abutting their lands.

DUST PREVENTIVES

Until comparatively recent years, the macadam road, if properly constructed of suitable material, was theoretically correct and practically sufficient to withstand the average traffic of our rural communities. It was dependent for its bond upon the dust produced by traffic, and so long as this dust remained upon the road surface to be washed into the interstices by occasional rains, a macadam road gave excellent and satisfactory service. With the advent of modern fast motor traffic, however, these roads began to deteriorate rapidly, since the rubber tire created practically no dust, but raised such as there was and allowed it to be carried away from the surface. This displacement not only robbed the road of valuable binding material, but created a menace to the health and comfort of the community. The need for a remedy soon became of paramount importance, and we have at present a great variety of materials for the purpose of laying the dust and thus tending to preserve the surface.

Water has been, of course, the best known and most generally employed dust preventive. It effects a mechanical bond between the particles of dust and rock, and with certain types of rock it has been shown to develop a chemical bond by hydrolyzing some of the rock components with the formation of colloidal cementing materials. The effect, however, is only temporary, and under heavy motor traffic, in dry weather, continual sprinkling is necessary which soon becomes an expensive item. Sea water has been tried with better success, owing to the fact that certain magnesium and calcium salts contained in it are capable of retaining moisture for a considerable length of time. The large amount of common salt also contained forms an objection to sea water, since in wet weather it leads to the formation of a salty mud which is injurious to the paint and iron work of vehicles. The good results of sea water without its disadvantages are obtained by the use of calcium chloride which is obtained as a comparatively cheap by-product in the manufacture of soda by the ammonia or Solvay process. This material was formerly applied in solution, but recently it has been prepared in a fine granular form to be spread over the road surface in a thin layer. It takes up water immediately, giving the surface a damp appearance, and proves quite efficient where the average moisture in the atmosphere is sufficient to feed the salt. Otherwise, an occasional light sprinkling with water is

necessary. The salt is, of course, washed away by repeated rains and must be replenished from time to time, so that the cost of the treatment is largely dependent upon local climatic conditions.

The purpose of the above-mentioned materials has been essentially to retain water as a binding agent in the road surface. Another by-product which of itself contains some excellent binding qualities is commercially known as "Glutrin." It is a concentrated waste sulphite liquor obtained by the evaporation and treatment of liquors obtained in the manufacture of paper from wood pulp by the sulphite process. When diluted with water and applied to the surface of a macadam road, it effectively reduces the formation of dust, and produces a firm, hard surface. The binding material, however, is soluble in water, and the treatment must be repeated during a season.

The waste molasses or "black strap" from sugar refineries in conjunction with milk of lime has also been used in surface treatment, and this gives some promise of becoming an economic and satisfactory material in localities where it can be obtained cheaply. It depends for its binding value upon the formation of calcium sucrates by the action of lime on the sugar contained in the molasses. These are tough, sticky substances, sparingly soluble in water and possessing considerable binding value. The use of this material is at present, however, an experimental proposition.

The greatest development in the preparation of dust preventives has been made in the utilization of bituminous products such as petroleum, coal tars and water-gas tars. These materials were first used in their crude state, but the results were only partially satisfactory, so that now we have to deal almost entirely with refined products. Practically the only exceptions to this statement are the recently exploited Trinidad oils, which consist naturally of a light volatile fluid carrying a large amount of true asphaltic base, and some of the more fluid crude California petroleum which are all of an asphaltic nature. Artificial products in many ways resembling the Trinidad oils have been produced by fluxing and cutting back some of the oil asphalts with volatile distillates. Petroleum distillates are used to some extent as dust preventives, but their effect is only that of a temporary dust layer owing to the fact that they do not carry any binding base whatever. Fluid residual petroleum obtained by removing the water and some of the more volatile fractions from the crude material are used extensively, and with considerable success when derived from an asphaltic or semiasphaltic crude oil which contains a sufficient amount of true binding base. The more fluid products are applied cold, while the viscous materials must be heated before application.

In order to facilitate the application of petroleum products, more particularly to park roads and suburban streets, emulsions

have been prepared with some cheap soap as the emulsifying agent. When such an emulsion is properly compounded, the oil becomes readily miscible with water and can be successfully applied from an ordinary sprinkling cart. Many of the large producers now have on the market so-called emulsified oils which contain a proper amount of soap to permit of their being mixed with water quite readily.

Increasing quantities of tars which are obtained as by-products from our gas and coke industries, are being used for the manufacture of dust preventives and road binders. Low carbon coke oven tars and water-gas tars or mixtures of the two when properly refined are the most desirable of this type of product for cold surface applications; and a considerable amount of work is being done with light tars carrying a small percentage of an oil asphalt in solution.

The cold application of any of the types of petroleum or tar products may be made when the material is sufficiently fluid, but the more viscous products must be heated. In either case, best results are obtained by first cleaning and repairing the road surface, after which an application of sufficient material to uniformly cover the surface should be made. The quite common mistake of flooding the surface and permitting large quantities of material to go to waste in the ditches should be guarded against. When possible, traffic should be kept off the road for ten or twelve hours to allow the application to penetrate thoroughly, after which a light coat of sand or stone screenings may be spread over it. A treatment of this character not only keeps down the dust for some time but, when a proper grade of material is used, forms a protecting mat which prevents excessive wear on the road surface.

HIGHWAY BRIDGES AND CULVERTS

The proper material to use in the construction of any particular bridge or culvert will depend almost wholly on local conditions, such as area of waterway required, character and amount of traffic, available funds, etc. For bridges of considerable span steel is commonly used, though long arches of concrete, stone or brick are not unusual. For the shorter spans up to 30 or 40 feet reinforced concrete is well adapted. Culverts are built of various materials, such as stone, brick, concrete, and pipe of cement, vitrified clay, corrugated iron, or cast iron. Wood is also frequently used, but the high cost of maintenance, and the inconvenience and discomforts attending periodic repairs or renewals, make it a very undesirable material of which to construct highway bridges or culverts, and its use should be avoided.

Steel Bridges

Because of its toughness and great unit strength, steel is peculiarly well adapted for use in bridge construction. Cast and wrought iron were formerly much used for this purpose, but in recent years have been generally supplanted by steel.

A complete discussion of the subject of steel bridges would occupy too much space to be undertaken here. There are a few essential details, however, which may be profitably pointed out.

Design

The design of steel bridges is now almost an exact science, and most of the bridge companies doing business in this country are amply equipped for executing designs under any reasonable set of conditions that may be imposed. It is obviously bad practice, however, to invite bids for furnishing and erecting a proposed bridge from these companies upon their own plans, without first having prescribed a complete and definite set of conditions to which the designs must conform. Otherwise, in the absence of a standard of excellence, no adequate comparison can be made of the bids received. Also, irresponsible parties are likely to secure the contract by submitting low bids with very light designs. Provision should always be made for having bridge designs checked by a competent, disinterested designer.

Loading

The loading which any particular highway bridge should be designed to sustain will in general depend on the local traffic conditions. Due allowance, however, should always be made for reasonable increases both in the amount of traffic and in the weight of concentrated loads. For rural bridges it is usually sufficient to provide for a uniform live load of 125 pounds per square foot, or for a load of 20 tons concentrated on two axles 10 feet apart, with wheels spaced 6 feet on axles and two-thirds of load on rear axle.

Piers and Abutments

A large percentage of the bridge failures in this country have been due to improperly designed abutments. There seems to be a general tendency to confuse the design of abutments with that of piers, and it is not unusual to see a bridge, consisting of a single span, supported on four slender cylindrical piers with no other provision for restraining the material of the approach embankment than wooden boards resting against these piers. Now, there can be no objection to the use of properly designed cylindrical piers for supporting intermediate spans; but the abutment must serve a dual purpose. It is required to support the bridge and also to act as a retaining wall for the approach; and both of these functions should be considered in making the design.

Foundations for Piers and Abutments

In designing piers and abutments, the size of the footings should usually depend on the character of the foundation material. Investigations should, therefore, be made in the vicinity of each pier or abutment before the design is completed. The foundation may be tested by sounding with rods, by boring with wood augers, by sinking pipes with water jets or by drilling with a percussion drill.

When the character of the foundation material has been determined, its safe bearing capacity may be estimated from the following table, taken from Office of Public Roads Bulletin No. 43:

Material	Bearing power (tons per square foot)
Quicksand and wet soils.....	0.05 to 1
Dry earth.....	1 to 1.5
Moderately dry clay.....	2 to 4
Dry, stiff clay.....	4 to 6
Sand.....	2 to 4
Sand, compact and cemented.....	4 to 6
Gravel, cemented.....	8 to 10
Rock.....	200

Where the material of the foundation is poor, as, for example, wet clay or quicksand, it is customary to increase its bearing power by making use of piles, which are driven to such depth as is necessary to prevent settling after the weight of the whole structure is super-imposed, the piles being considered as carrying the entire load. The formula in most general use for determining the amount of driving necessary to produce this condition is that proposed by the *Engineering News*, $P = \frac{2WH}{S+}$, in which P is the safe load in pounds on one pile, W the weight of the hammer in pounds, H the fall of the hammer in feet, and S the penetration or sinking in inches under the last blow.

Floors

Highway bridge floors are made of wood, reinforced concrete or steel. Wood floors are probably the most common, but reinforced concrete presents many advantages over wood for this purpose, and is becoming very popular. Wood floors on old bridges, however, should never be replaced by concrete, unless the change was anticipated in the original design. Neither should the thickness of the wood floor be much increased, as any additional weight put on the structure for which provision has not been made, is likely to prove disastrous.

The economical thickness for wood floors depends on traffic and climatic conditions, as well as on the quality of the wood. In general, it should be such that the wood will have practically worn out before being destroyed by decay. This economical thickness varies from $2\frac{1}{2}$ to 4 inches.

Concrete or steel floors should always be protected from the traffic by a cushion of earth or macadam.

Painting

Steel bridges should ordinarily be repainted about once every three years. If this work is neglected, as is so frequently the case, rust soon makes inroads into the metal, impairing both its strength and appearance.

Concrete Bridges and Culverts

There are three types of reinforced concrete culverts which are known as the flat slab, the T-beam, and the steel I-beam incased in concrete. The flat slab should not be built less than 6 inches thick for a 2-foot span, and the greater the span, the greater must be the thickness of the slab. The slabs are reinforced with

steel bars or other equivalent reinforcing metal, and the cross-sectional area of the steel reinforcing required is about 1 per cent that of the concrete slab. This type is practical for clear spans up to 12 or 16 feet.

The T-beam type of reinforced concrete culvert is practical for spans which are greater than those given for the flat slabs, up to 30 or 40, or perhaps 50 feet in the clear, although the larger spans are not recommended.

One of the best types of culverts for spans from 10 feet to 30 feet is the steel I-beam incased in concrete. In this type the steel I-beams are designed to transmit the load to the abutments, while the concrete floor, which is also reinforced with steel bars or equivalent reinforcing metal, transmits the load to the I-beams. The concrete around the I-beams is placed there to protect them from rust, which practically insures a permanent culvert.

The reader is referred to the sketches herewith which illustrate the types described, and further information concerning the subject of highway bridges and culverts may be obtained from Bulletin No. 43 issued by the United States Office of Public Roads, Washington, D. C., which may be had upon request.

Pipe Culverts

Vitrified clay, cast iron, corrugated iron, steel plate and cement pipes are used for the smaller culverts. Up to 24 inches in diameter pipe culverts are usually economical and the pipes are easily handled and laid. They should be laid true to grade and on a firm foundation. Headwalls of concrete, brick or stone should be constructed at each end, extending high enough to carry the fill and below the frost line.

Metal Pipe Culverts

These include cast iron pipe, steel plate pipe, and corrugated iron pipe. Cast iron and steel plate pipe have been satisfactorily used for a number of years. They are both rather expensive, however, and their use in highway work is frequently precluded on this account.

Corrugated metal pipe, made of pure iron has been on the market for only a short time, but promises to prove a valuable addition to the list of culvert materials. The corrugations enable the required strength to be obtained with very thin metal, and it is claimed that the pure iron of which the pipe is made offers superior resistance to corrosion. Acid tests seem to bear out this claim, but time alone can furnish the real test of usage.

Vitrified Clay Culvert Pipe

In localities where the ground does not freeze to great depths, vitrified clay pipe has proven very satisfactory as a culvert material. It is comparatively inexpensive, and can be readily obtained in nearly all localities.

General requirements for vitrified clay culvert pipe may be stated as follows: It should be double strength, hard burned, and salt glazed. Each pipe should be a true cylinder, and reasonably straight longitudinally, free from cracks, and have a thickness of shell of at least one-twelfth of the internal diameter.

In laying the culvert, care should be taken to round out the bottom of the ditch to fit the pipe, making suitable depressions for the bells. Where rock occurs in the ditch, it should be excavated some 6 inches below the lower surface of the pipe and replaced with clay or sand. The surface of the roadway should never be less than $1\frac{1}{2}$ diameters above the top surface of the pipe.

Importance of Engineering Supervision

Before leaving the subject of bridges and culverts, attention should be called to the importance of having the design and construction of all such structures executed under the immediate supervision of a competent engineer. In no other feature of highway improvement can technical training be employed to better advantage. Not only the efficiency of the structure itself is involved, but human safety is not infrequently dependent on its proper design and construction.

BOND ISSUES, APPROPRIATIONS AND MILEAGE

Alabama

Funds Available 1912. There will be available for State aid work from the State \$250,000 for the year 1912. This includes \$116,000 left over from 1911. Amount expended in 1911 by counties for construction and maintenance of roads and bridges, \$1,493,880.87 of which \$578,558.44 was derived from the sale of county bonds.

Amount available for roads and bridges for the year 1912, \$1,450,-113.

W. S. KELLER,
State Highway Engineer.

Bonds Voted 1911.—

Butler.....	\$155,000
Perry.....	110,000
Coffee.....	100,000
Elmore.....	170,000
Russell.....	100,000
Total.....	\$635,000

Mobile County voted \$500,000, November 7, 1910.

Mileage.—The total mileage of public roads at the close of 1909 was 49,639 of which 683.5 miles were stone, 1398 miles gravel, and 1107 miles sand-clay. This is according to Bulletin 41, U. S. Office of Public Roads. State highway engineer reports 3780 miles improved at present time, including 19 miles macadam, 64 miles chert, 192 miles gravel, 135 miles sand-clay, and 828 miles graded earth constructed in 1911.

State Aid 1911.—Applications received from 45 counties, surveys made in 22 counties, construction work done in 14 counties.

Arizona

Mileage.—The total mileage of public roads at the close of 1909 was 5987 of which 248 miles were gravel and 25 miles sand-clay. Roads constructed 1911, about 81 miles. Materials used were disintegrated granite, caliche, and oil. Expenditures for 1911 approximately \$245,000.

Arkansas*Bonds Voted 1911.*—

Jefferson.....	\$30,000
Lee (Imp. Dist.).....	100,000
Total.....	\$130,000

Mileage.—The mileage of public roads at the close of 1909 was 36,445 of which 170 miles were stone, 537 miles gravel and 378 miles sand-clay. This is according to Bulletin 41, U. S. Office of Public Roads.

Alaska

Appropriation by Congress for 1911 was \$150,000.

Mileage.—Mileage of roads and trails 1911 as follows:

	Miles
Wagon roads.....	800
Winter sled roads.....	534
Trails.....	1,107
Trails temporarily staked.....	450

California

From 1895 to 1898 inclusive, the State appropriations were for repairs, etc. From 1899 to 1910 small appropriations were made for construction of bridges and State mountain roads. The \$18,000,-000 State bond issue is now available.

Funds Available 1912.—The State of California has appropriated the sum of \$18,000,000 for a system of State highways. No limit has been placed upon the amount to be expended in any year and the whole sum might be spent in one year were that possible. The people want the roads quickly and they expect that a very considerable mileage will be completed and in use by the time the exposition at San Francisco is opened in 1915.

A. B. FLETCHER,
Highway Engineer.

Bonds Voted 1911.—

Glenn.....	\$160,000
Glenn (bridges).....	290,000
Los Angeles (bridges).....	100,000
Santa Barbara (1909-1911).....	190,000
San Joaquin (1909-1911).....	1,280,000
Ventura (bridges).....	275,000
Total.....	\$2,295,000

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 48,069 of which 579 miles were

stone, 6054 miles gravel, 1289 miles sand-clay, and 653 miles oiled.

Colorado

Funds Available 1912.—Owing to legal difficulties in our State our road funds are tied up at this writing. We are hoping for a favorable decision sometime during April. There is now in our State treasury about \$500,000 to be used for road work. This amount will be increased to nearly a million dollars by next January.

C. P. ALLEN,
Chairman.

There is a proposition up before the people to be voted upon at the general election next November to authorize an issue of \$10,000,000 for State aid on roads and also to authorize bond issues by the counties for the same purpose.

Mileage.—The total mileage of public roads at the close of 1909, according to Bulletin 41, U. S. Office of Public Roads, was 29,693 of which 14 miles were macadam and 306.5 miles gravel.

There were 101 miles of State aid road completed at the close of 1911.

Connecticut

Act approved September 19, 1911, provides for bond issues to be expended during two years ending September 30, 1913, of \$3,000,000.

Funds Available 1912.—Of the above amount \$2,000,000 was for trunk lines and \$1,000,000 for the main roads. To the \$1,000,000 is to be added one-fourth or one-eighth of the allotment part of this appropriation. So we have at the present time available for new construction \$2,000,000 for trunk lines, of which I should say \$100,000 is already under contract, and \$1,252,000 for the main roads. In addition to the above we also have about \$300,000 from old appropriations which are to be added to the above appropriation for main roads. All of these amounts are now available and will be placed under contract as soon as conditions will permit.

E. H. KELSEY,
Deputy.

Mileage:—

YEAR	MILES IMPROVED	STATE AID APPROPRIATION
1895	35 }	\$150,000
1896	42 }	
1897	43 }	
1898	48 }	200,000
1899 }	109	350,000
1900 }		
1901 }	138	450,000
1902 }		
1903 }	121	450,000
1904 }		
1905 }	112	539,000
1906 }		
1907 }	213	1,500,000
1908 }		
1909		*
1910		*
1911		*

* Report not yet issued.

NOTE: Total expenditure to close of 1911, \$6,539,204.74.

Bulletin 41, U. S. Office of Public Roads gives total mileage at close of 1909, 12,583 of which 665.62 miles were surfaced with stone 774.4 miles with gravel and 1,214.25 miles with sand-clay.

Delaware

Funds Available 1912.—As far as Kent County is concerned, I understand that they have not issued any of the \$100,000 bonds authorized for road improvement. The \$200,000 issue by New Castle County is the third bond issue that we have had, the first, for \$300,000, was authorized in 1907, the second for \$300,000 was authorized in 1909, and the last, for \$200,000 was authorized in 1911, making a total of \$800,000. The second issue is nearly exhausted. We have sold \$95,000 worth of bonds of the third series and have spent of it about \$22,000. We expect to spend the remainder of it this year. The State allows us an appropriation of \$10,000 per year. We will have available to use this year approximately as follows: from bond issue No. 2, \$13,000; from bond issue No. 3, \$178,000; State of Delaware, \$10,000; total \$201,000. In addition to this there will be some money appropriated out of the general county funds for road building and probably about \$20,000 to \$30,000 for road maintenance."

FRANCIS A. PRICE,
New Castle County State
Highway Commissioner.

Mileage:—

YEAR	MILES IMPROVED	STATE AID APPROPRIATION
1903 }	8.9	\$37,177.14
1904 }		
1905 }	10.6	21,522.21
1906 }		
1907 }	52.7	22,000.00
1908 }		
1909 }	37.9	22,000.00
1910 }		
1911	(16.81)*	
Less previously reported	12.51 4.30	30,000.00†
Total.....	114.43	
Less.....	0.73 resurfac'g	
Net Total.....	113.70	

* Cost about \$147,000

† \$10,000 to each county.

The total mileage of public roads at the close of 1909 was 3000 miles according to Bulletin 41, U. S. Office of Public Roads, of which 96 miles were stone, 49 miles gravel and 35 miles shell.

Florida

Funds Available 1912.— The total expenditure on public roads during 1910 in Florida exclusive of statute labor is conservatively estimated as \$1,250,000. This estimate is based on the actual returns from forty-four of the counties, and an estimate of the expenditures in the remaining four (now five) counties. The expenditure during 1912 will I believe be somewhat in excess of this amount.

E. H. SELLARDS,
State Geologist.

Bonds Voted 1911.—

Columbia.....	\$40,000
Walton.....	70,000
St. Lucie.....	200,000
Total.....	\$310,000

Data on public roads in Florida collected by the State Geological Survey, 1910

COUNTY	ESTIMATED TOTAL MILEAGE OF ALL PUBLIC ROADS	IMPROVED ROADS, MILEAGE, DIMENSIONS AND COST, EXCLU- SIVE OF GRADED DIRT ROADS		TOTAL EXPENDITURES ON ROADS AND BRIDGES, 1910, EXCLUSIVE OF LABOR
		Surfaced roads as- phalt (a); brick (b); cement (c); gravel (g); marl and crushed stone (m); straw (st.); sand-clay (s-c); shell (sh)	Cost per mile	
Alachua.....	900†	111 s-c.	\$800.00	\$24,000.00
Baker.....	500†	$\frac{1}{4}$ s-c.		4,399.00
Bradford.....	500-600	7 st.	30.00	11,000.00
Brevard.....	250†	20 m.		11,019.93
Calhoun.....	250			3,967.17
Citrus.....	150	$\left\{ \begin{array}{l} 35 \text{ m.} \\ 25 \text{ s-c.} \end{array} \right.$	$\left\{ \begin{array}{l} 750.00 \\ 1,000.00 \end{array} \right.$	14,500.00
Clay.....	200†	$\left\{ \begin{array}{l} 3 \text{ sh.} \\ \frac{1}{2} \text{ s-c.} \end{array} \right.$	$\left\{ \begin{array}{l} 1,500.00 \\ 1,000.00 \end{array} \right.$	3,000.00
Columbia.....	150			3,400.00
Dade.....	175	154 m.	$\left\{ \begin{array}{l} 1,000.00 \\ 1,600.00 \\ 1,900.00 \end{array} \right.$	138,200.27
DeSoto.....	650†	15 s-c.		39,866.55
Duval.....	505	18.1 m.	8,000.00	
		33.1 sh.	7,500.00	
		5.2 c.	9,240.00	
		8.5 b.	15,000.00	
		0.4 a.	8,000.00	
		6.5 g.	18,538.14	
Escambia.....	1,000	$\left\{ \begin{array}{l} 115 \text{ s-c.} \\ 4 \text{ g.} \end{array} \right.$	$\left\{ \begin{array}{l} 1,000.00 \\ 9,000.00 \end{array} \right.$	40,354.90
Franklin.....	30	25 sh.		4,406.21
Gadsden.....	500	31 s-c.	350.00	16,000.00
Hamilton.....	300	4 s-c.	750.00	10,000.00
Hernando.....	150			4,146.50
Hillsboro.....	500	$\left\{ \begin{array}{l} 75 \text{ m.} \\ 25 \text{ sh.} \end{array} \right.$	$\left\{ \begin{array}{l} 5,000.00 \\ 3,800.00 \end{array} \right.$	147,463.38
		25 s-c.		
Holmes.....	1,000†			4,588.65
Jackson.....	400			3,000.00
Jefferson.....	350†			2,326.41
Lafayette.....	1,000			1,130.71
Lake.....	200	$\left\{ \begin{array}{l} 70 \text{ s-c.} \\ 107 \text{ st.} \end{array} \right.$	$\left\{ \begin{array}{l} 500.00 \\ 40.00 \end{array} \right.$	18,443.37
		20 m.	1,500.00	
Lee.....	250	150 s-c.	100-500	14,947.48
Leon.....	450†			12,227.52
Levy.....	425	$\left\{ \begin{array}{l} 4 \text{ sh.} \\ 3 \text{ s-c.} \end{array} \right.$		3,163.36

† From Bulletin 32, Office of Public Roads, 1907.

Data on public roads in Florida collected by the State Geological Survey, 1910
—continued

COUNTY	ESTIMATED TOTAL MILEAGE OF ALL PUBLIC ROADS	IMPROVED ROADS, MILEAGE, DIMENSIONS AND COST, EXCLU- SIVE OF GRADED DIRT ROADS		TOTAL EXPENDITURES ON ROADS AND BRIDGES, 1910, EXCLUSIVE OF LABOR
		Surfaced roads: as- phalt (a); brick (b); cement (c); gravel (g); marl and crushed stone (m); straw (st); sand-clay (s-c); shell (sh)	Cost per mile	
Liberty.....	236			\$4,879.49
Madison.....	238†	21 s-c.		6,500.00
Manatee.....	500†	2 m.	2,000.00	
Marion.....	1,000	{ 97 m. 150 s-c. }	2,300.00	40,000.00
Monroe.....		3.2 m.	3,800.00	800.00
Nassau.....	260†	20 sh.		15,000.00
Orange.....	250	{ 16 m. 90 s-c. 35 st. }	{ 2,000.00 1,000.00 40.00 }	30,000.00
Osceola.....	275‡	10 m.	1,500.00	18,000.00
Palm Beach.....		58 m.	{ 2,500.00 3,000.00 }	150,400.00
Pasco.....	250†	{ 3 m. 4 s-c. 11 st. }	{ 4,500.00 1,000.00 40.00 }	4,418.13
Polk.....	700	{ 18 m. 54 s-c. 55 st. }	{ 1,500.00 800.00 40.00 }	25,000.00
Putnam.....	500-600	{ 10 sh. 40 s-c. 12 g. }	{ 850.00 1,600.00 1,000.00 }	155,000.00
Santa Rosa.....	250	50 s-c.	1,000.00	15,000.00
St. Johns.....	160	{ 16 sh. 12 st. }	{ 2,000.00 150.00 }	
St. Lucie.....	140-200	{ 4 m. 10 sh. 5 m. }	{ 1,800.00 500.00 800.00 }	15,000.00
Sumter.....	400	{ 30 s-c. 4 m. 4 s-c. }	{ 700.00 700.00 700.00 }	3,800.00
Suwanee.....	1,000	{ 4 m. 4 s-c. }		7,000.00
Taylor.....	200	3 m.	5,180.00	3,000.00
Volusia.....	250	{ 75 m. 50 st. }	{ 2,750.00 35.00 }	33,000.00
Wakulla.....	100			600.00
Walton.....	150-200	3 s-c.		8,000.00
Washington.....	500	4 s-c.	800.00	10,000.00
Total.....	17,954	2,070 $\frac{3}{4}$		‡1,080,949.03

† From Bulletin 32, Office of Public Roads, 1907.

‡ The expenditure on roads was not reported for Duval, Manatee and St. Johns Counties.

Georgia*Bonds Voted 1911.—*

Dodge.....	\$30,000
Troup.....	200,000
Total.....	\$230,000

Mileage.—The total mileage of public roads at the close of 1909 was 82,230 of which 880.5 miles were gravel, 4,326.5 miles sand-clay, 4522 miles stone. This is according to Bulletin 41, U. S. Office of Public Roads.

Idaho

Funds Available 1912.—Amounts available for 1911–12, \$260,000 to be expended under supervision of State engineer.

Bonds Voted 1911.—

Custer.....	\$15,000.00
Oneida.....	23,795.50
Total.....	\$38,795.50

Mileage.—There were 3 miles of macadam road constructed and 60 miles of earth road improved in 1911, as reported by State engineer. Bulletin 41, U. S. Office of Public Roads gives the mileage at the close of 1909 as 18,403, 17 miles of which were stone, 95.5 miles gravel, and 398 miles sand-clay.

Illinois

Funds Available 1912.—In 1912 the appropriation for this department is \$100,000 which is the only amount appropriated by the State for road work. This money will be used principally in supervision of work placed voluntarily under the control of this department by the local authorities. It is estimated that there will be from \$500,000 to \$700,000 worth of work carried out under the State highway commission's plans, which include both road and bridge work. The department will spend about \$12,000 in actual construction expense, which will enable us to carry out certain special features of construction for which it seems desirable that the State should bear the expense. This will apply particularly to applications of special bituminous compounds and for demonstrations in maintenance of some of the roads built in past years. The total amount that will be spent by the local officials throughout the State in 1912, including money from all sources, will be very close to \$7,000,000.

A. N. JOHNSON,
State Engineer.

Bonds Voted 1911.

Pike County (townships).....	\$5,000
Edgar.....	40,000
Total.....	\$45,000

Mileage and State Aid 1911.—Demonstration roads constructed with machinery owned by State highway department, as follows: bituminous macadam 10 miles, water bound macadam 12 miles. Bridge inspections 300; bridges designed 241; contracts made for 166 concrete and 31 steel bridges. The total mileage at the close of 1909 according to Bulletin 41, U. S. Office of Public Roads, was 94,141 of which 8914 miles were improved.

Indiana

Funds Available 1912.—First, in regard to cash appropriations available for public roads in 1912. This is a very difficult problem to get at, but as near as I can get it, the various counties will have for maintenance and upkeep, to spend under the direction of county superintendents, \$2,212,910.36. Then there is another fund raised by the various townships in the State, a large part of which may be worked out. It is difficult to get this accurately, but approximately the total is \$1,800,000, less than \$200,000 of which is payable in cash. The balance is worked out by railroads and other public service corporations and the farmers.

C. A. KENYON,

President State Good Roads Association.

Bonds Issued 1911.—Gravel road bonds outstanding January 1, 1912, \$16,930,977.57. The counties raised by direct tax for free gravel road repairs in 1911, \$1,361,118.31. Data obtained from State statistician.

Clinton.....	\$120,000	
Vigo.....	65,861	
Wabash.....	200,000	
Gibson.....	52,800(1)	\$13,400(2)
Montgomery.....		25,000(2)
Bartholomew.....	16,693(1)	20,000(2)
Total.....	\$455,354	\$58,400

Mileage.—The total mileage is about 68,000, divided as follows: stone roads, 4400 miles, gravel roads 20,229 miles, total improved mileage 24,629 which leaves 43,371 miles unimproved. (1) New roads; (2) Gravel road repairs.

Iowa

Funds Available 1912.—I estimate the amount of money that will be spent on road improvement, which includes culverts and bridges, about as follows: State appropriation for highway commission, \$10,000; auto tax distributed by the State, \$300,000; township road fund, controlled by township trustees, \$2,000,000; township drag fund controlled by township trustees, \$500,000; county road fund controlled by the county supervisors, \$750,000; and county bridge fund, controlled by the county supervisors, \$3,200,000. The above are cash taxes. In addition to these are some labor taxes which would roughly estimate at two to three hundred thousand dollars.

THOS. H. MACDONALD,
Highway Engineer.

Bonds Voted 1911.—

Audubon (bridges).....	\$42,000
Calhoun (bridges).....	40,000
Cass.....	158,000
Lucas (1910-11).....	31,600
Mills (1909-11, bridges).....	27,000
Wapello (Bridge Bonds).....	33,000
Polk (Funding Bridge).....	100,000
Total.....	\$431,600

Mileage.—The total mileage of public roads at the close of 1909, was 102,427 of which 357 miles were stone, 1573 miles were gravel and 575 miles were sand-clay. These statistics are from Bulletin 41, U. S. Office of Public Roads.

Kansas

Funds Available 1912.—I can only give the figures approximately at this time for I have not been able to compile them for the whole State but the county and township funds for roads and bridges for 1912 will amount to approximately \$3,500,000. I think you understand that our constitution prohibits the State from doing internal improvement work so that no State aid can be granted. About \$7000 will be available for the work of this office from college appropriations.

W. S. GEARHART,
State Engineer.

Bonds Voted 1911.—

Bourbon.....	\$3,209.80
Johnson.....	54,025.00
Wyandotte.....	640,000.00
Total.....	\$697,234.80

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total road mileage 98,302 of which 137 miles were stone, 28 miles gravel, and 202 miles sand-clay. This was at the close of 1909.

Kentucky

Bonds Voted 1911.—Bracken County, \$21,500.

Mileage.—According to Bulletin 41, U. S. Office of Public Roads, at the close of 1909, the total mileage of public roads was 53,744 of which 8709 miles were stone, and 1404 miles were gravel.

Louisiana

Funds Available 1912.—The State of Louisiana has voted one-quarter of 1 mill on the total assessed valuation of all property, which tax amounts to approximately \$132,000 for the year 1912. This amount represents the actual cash derived from the State for good roads. The State through the board of control of the State penitentiary, has materially aided the construction of roads by furnishing convict labor. Taking into consideration the amounts subscribed by the various parishes, the following figures will give you a general idea as to the extent of road construction this Department has under its supervision for the year 1912:

State Tax (Estimated).....	\$130,000.00
Convict Labor (Estimated).....	120,000.00
Parish's Portion.....	260,000.00
Total	\$550,000.00

The above refers only to State Aid propositions and does not include any projects undertaken independently by municipalities and parishes, road districts, or projects constructed by private subscription. This department compiled a statement some time ago, which shows the total expenditures for good roads made in Louisiana during the year 1911, by the parishes, municipalities, convict camps, etc., to be \$4,613,182.61. I have every reason to believe that the five million mark will be reached in 1912.

C. C. SANDOZ,
Secretary.

Bonds Voted 1911.—Iberbille County (Plaquemines), \$60,000.

Mileage.—The total mileage of public roads in the State at the close of 1909 was 24,962 of which 82.5 miles were gravel and 168 miles sand-clay. From Bulletin 41, U. S. Office of Public Roads (see convict labor chapter for detailed mileage information.)

Maine*Funds Available 1912.—*

Net unexpended balance from previous years.....	\$135,267.84
Appropriation 1912.....	250,000.00
Estimated automobile licenses.....	100,000.00
Total.....	\$485,267.84

Legislature has just passed an act providing for a \$2,000,000 bond issue to be voted on by the people in September, 1912.

Mileage.—

YEAR	MILES BUILT	STATE AID APPROPRIATIONS
1901	2.56	\$15,000.00
1902	28.14	40,000.00
1903	53.06	40,000.00
1904	51.67	40,000.00
1905	65.48	50,000.00
1906	83.17	70,000.00
1907	78.94	70,000.00
1908	84.11	131,577.66
1909	80.37+1.18*	142,737.49
1910	111.38+0.76†	321,159.35
1911	110.43+1.13‡	250,000.00
1912		250,000.00

* 1908 work completed in 1909.

† 1909 work completed in 1910.

‡ 1910 work not reported in 1910.

Bulletin 41, U. S. Office of Public Roads, gives the total mileage at 25,528 of which 98 miles were stone, 2494 miles gravel and 111 improved earth. This at the close of 1909.

Maryland

Funds Available 1911-1912.—Would say that \$1,250,000 worth of State bonds were issued in the year 1911 for State road work in Maryland. The same amount has so far been issued in 1912, and no more will be issued this year unless a further issue is authorized by the legislature now in session. In addition to these funds, in each of the years mentioned, there has been available for State aid work the annual appropriation of \$200,000, and for the Baltimore-Washington road work the annual appropriation of \$60,000.

W. W. CROSBY,
Chief Engineer.

Bonds Voted 1911.—

Baltimore County.....	\$1,500,000
Dorchester County.....	25,000
Montgomery County.....	20,000
Cecil County.....	14,000
Total.....	\$1,559,000

Mileage.—

YEAR	MILES BUILT	STATE AID APPROPRIATIONS
1898	0.50	\$10,000
1899	0.00	10,000
1900	4.00	10,000
1901	9.50	10,000
1902	13.00	10,000
1903	6.50	10,000
1904	4.50	10,000
1905	7.00	210,000
1906	28.30	240,000
1907	16.70	240,000
1908	25.80	298,000
1909	38.20	268,000
1910	24.60	328,000
1911	90.00*	1,510,000†
1912 }		3,845,000‡
1913 }		

* Sixty-five miles macadam, 16 miles of bituminous macadam, 6 miles of gravel and 3 miles of chert.

† Includes \$1,250,000 bonds issued.

‡ Includes \$3,170,000 State bonds issued.

The total mileage of public roads at the close of 1909 was 16,773, of which 488 miles were gravel, 1223 miles were stone and 408.5 miles shell. From Bulletin 41, U. S. Office of Public Roads.

Massachusetts

Funds Available 1912.—The amount of State money available for road work in Massachusetts in 1912, is as follows: For State highway construction, \$441,000. This includes a balance of about \$16,000 brought over from last year. For "small town" work, so-called, \$75,000. This money is allotted as follows: (a) \$25,000 is distributed in towns of over a million dollars valuation, and each town to which any money is allotted is required to allot a sum equal to that allotted by the commission. (b) \$25,000 is distributed to towns with a valuation under a million dollars, under the same conditions. (c) \$25,000 is distributed to towns under a million dollars valuation, which towns are not required to

contribute any money. The above State appropriation, namely, \$441,000 and \$75,000 are provided for by thirty-year bonds. For the maintenance of State highways, \$200,000 is available, this being a regular appropriation made by the State, the money being derived from annual revenue. In addition to this amount for maintenance, it is estimated that there will be approximately \$386,000 available from the Motor Vehicle Fees, for the improvement and maintenance of town roads, this last sum to be expended entirely under the direction of the commission. There are also, bills before the legislature carrying with them special appropriations, aggregating about \$200,000 to be used for specific roads, but these bills have not yet become law.

W. W. DEAN,
Chief Engineer.

Mileage.—

YEAR	MILES IMPROVED	STATE AID APPROPRIATIONS
1892		No appropriation for construction
1893		\$300,000
1894	25	400,000
1895	35	600,000
1896	47	800,000
1897	52	400,000
1898	46	500,000
1899	44	500,000
1900	46	500,000
1901	62	500,000
1902	57	500,000
1903	67	2,250,000*
1904	66	
1905	62	
1906	45	
1907	47	2,500,000*
1908	39	
1909	44.6	
1910	53	
1911	42 †	
1912		

* For construction during a period of five years: \$500,000 in 1903-04-05-06-07; \$500,000 in 1908-09-10-11-12.

† Total mileage of improved roads, December 31, 1910, 837.6 (Annual Report, 1910).

NOTE: The above figures do not include administration and maintenance.

Bulletin 41, U. S. Office of Public Roads gives a total mileage of 17,272 of which 2297 miles were stone and 6167 miles gravel. This at the close of 1909.

Michigan

Funds Available 1912.—I would say that this department has available for 1912 \$245,000 for the payment of State reward upon roads. This represents about a quarter of the actual cost of the roads. Our State reward system is somewhat different from other States, in that we pay a fixed amount of reward on different classes of road, gravel \$500 per mile and macadam \$1000 per mile.

TOWNSEND A. ELY,
State Highway Commissioner.

Bonds Voted 1911.—

Macomb—(Erie township).....	\$50,000
Alger.....	50,000
Mason.....	50,000
Marquette.....	26,000
Wayne (five years).....	2,000,000
Iron.....	150,000
Baraga (township issue).....	43,000
Kent.....	18,000
Kent.....	500,000
Ottawa.....	500,000
Schoolcraft.....	90,000
Dickinson.....	150,000
Saginaw.....	20,000
Ontonagon (township).....	10,000
Total.....	3,657,000

Mileage.—

YEAR	MILES BUILT	STATE AID APPROPRIATIONS
1905	20	\$30,000
1906	40	60,000
1907	80	110,000
1908	160	160,000
1909	214	150,000
1910	276	150,000
1911	360	245,000
1912		245,000

The total mileage of public roads at the close of 1909 were 68,906 of which 748 miles were stone, 3771 miles were gravel and 2382 miles were sand-clay. Taken from Bulletin 41, U. S. Office of Public Roads.

Minnesota

Funds Available 1912.—The amount of State aid money for 1912 is \$340,000 to be paid to the several counties on the basis of dollar for dollar. Total amount of county road and bridge fund,

\$1,408,124.61; total amount of town road and bridge fund, \$1,492 - 313.11; and delinquent taxes, \$362,173.94; grand total, \$3,602,- 611.66; item of county road and bridge fund includes two counties not reported, estimated at \$300,000. Above does not include statute labor tax.

GEORGE W. COOLEY,
State Engineer.

Bonds Voted 1911.—Cook County, \$60,000. During the year 1911 the sum of \$66,600 was loaned by the State to the various townships therein upon their bonds. It is estimated that \$50,000 of this amount was for roads and bridges.

Mileage.—

YEAR	MILES IMPROVED	STATE AID APPROPRIATIONS
1907	81.42	\$54,800
1908	183.15	72,650
1909	224.30	74,090
1910	418.29	79,400
1911	371.67	340,000

Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 79,323 of which 138 miles were stone, 4228 miles gravel and 1052 miles sand-clay.

Mississippi

Bonds Voted 1911.—

Copiah.....	\$75,000
Hinds.....	100,000
Lincoln.....	150,000
Monroe.....	150,000
Simpson.....	40,000
Tishomingo.....	35,000
Sharkey.....	50,000
Hancock.....	25,000
Oktibbeha (road district).....	20,000
Yalobusha.....	15,000
Total.....	\$660,000

Mileage.—The total mileage of public roads at the close of 1909 was 39,619, of which 52 miles were stone, 167 miles gravel, and 103 miles sand-clay. From Bulletin 41, U. S. Office of Public Roads.

Missouri

Funds Available 1912.—We cannot tell the amount of money that will be available for road work for 1912, but I think we will

have about \$80,000. This money is derived from the automobile licenses, and is apportioned to the counties on July 1 each year. The apportionment is based on the assessed valuation of the counties. We apportioned \$40,000 last year. We have another "road fund" known as the "good roads fund stamp act." This money is derived from the sale of stamps by the State auditor. We have \$85,000 on hand at this time, and this fund is increased at the rate of about \$3000 each month. This money will not be apportioned this year, for the reason that the governor vetoed the appropriation passed by the last legislature, and the auditor has no authority to make the apportionment without the appropriation.

JOHN P. GORDON,
State Auditor.

Bonds issued since May 1, 1911.—

Lafayette County, Lexington.....	\$125,000
Jefferson County, DeSoto.....	30,000
Boone County, Columbia.....	100,000
Boone County, Harg.....	20,000
Callaway County, Fulton.....	105,000
Greene County, Springfield.....	27,000
Barry County, Hollister.....	7,000
New Madrid County, New Madrid.....	93,000
Lawrence County, Mt. Vernon.....	50,000
Dade County, Greenfield.....	30,000
Dade County, South Greenfield.....	17,000
Pettis County.....	200,000
Total.....	\$804,000

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the mileage at the close of 1909, as 107,923 of which 1241 miles were stone and 3512.5 miles were gravel.

Montana

Bonds Voted 1911.—

Custer.....	\$100,000
Sweet Grass.....	35,000
Lincoln.....	125,000
Flathead.....	52,500
Total.....	\$312,500

Mileage.—According to Bulletin 41, U. S. Office of Public Roads, at the close of 1909 the total mileage was 23,319 of which 94.5 miles were gravel.

Nebraska

Bonds Voted 1911.—

City of Columbus, Platte County.....	\$25,000
Columbus Township, Platte County.....	5,000
Oconee Township, Platte County.....	6,000
Loup Township, Platte County.....	3,000
Keya Paha County.....	30,000
Morrill County (roads and bridges)	32,000
Total.....	\$101,000

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the mileage at the close of 1909 at 80,338, of which 52.5 miles were stone and 180 miles sand-clay.

Nevada

Annual appropriation of \$20,000 for maintenance of convict labor.

Bonds Voted 1911.—Churchill, \$10,000.

Mileage.—The total mileage at the close of 1909 according to Bulletin 41, U. S. Office of Public Roads, was 12,751 of which one mile was stone and 45 miles gravel.

State engineer reports one and one-half miles macadam road, and 4 miles of gravel road built and 10 miles sand-clay road repaired in 1911 at a total cost of \$18,000.

New Hampshire

Funds Available.—The amount of bonds issued by the State to aid towns in building highways in 1911 was \$250,000. The amount of State money available in 1912 is as follows: for trunk line construction \$310,000; for maintenance of trunk lines \$75,000; and for construction of non-trunk line roads \$68,000.

H. C. HILL,
Former State Engineer.

YEAR	MILES BUILT	STATE AID APPROPRIATIONS
1905	18.04	\$72,478.65
1906	68.50	61,515.70
1907	67.36	91,032.17
1908	79.34	101,837.76
1909	66.33	148,036.00
1910	184.00	516,962.09
1911	112.91	273,621.61

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage 15,116 of which 202 miles were stone, and 1247 miles were gravel, at the close of 1909.

New Jersey

Funds Available 1912.—Our appropriation for new construction during the year 1912 is \$400,000 and the appropriation from the motor vehicle fund for repairs will be about \$350,000.

E. A. STEVENS,
Commissioner.

Bonds 1911.—

Sussex.....	\$17,600
Cape May.....	212,500
Burlington (township).....	25,000
Atlantic.....	100,000
Atlantic (Bridge Bonds).....	60,000
Bergen (issued).....	133,000
Essex (issued).....	200,000
Hudson (issued).....	425,000
Total.....	\$1,173,100

State appropriations

1891.....	\$20,000
1892.....	75,000
1893.....	75,000
1894.....	75,000
1895.....	100,000
1896.....	100,000
1897.....	100,000
1898.....	100,000
1899.....	150,000
1900.....	150,000
1901.....	150,000
1902.....	250,000
1903.....	250,000
1904.....	250,000
1905.....	250,000
1906.....	250,000
1907.....	250,000
1908.....	300,000
1909.....	300,000
1910.....	300,000
1911.....	400,000
Total.....	\$3,895,000

Mileage.—

The total mileage of public roads at the close of 1909 was 79,279 of which 4615 miles were macadam, and 8173 miles were gravel. This from Bulletin 41, U. S. Office of Public Roads.

Total number of miles of each class of road built in each county since the passage of the State aid law

COUNTY	MACADAM	TELFORD	ASPHALT BINDER	TAR BINDER	AMESITE	G.F.B.	FLBERTINE	BITULITHIC	GRAVEL	SHELL	BOG ORE	TOTAL
Atlantic.....	3.27								107.905			111.175
Bergen.....	29.556		2.31	2.437								34.303
Burlington.....	123.383	34.68			10.33				29.66			187.723
Camden.....	46.865	25.365	2.404						22.586			107.550
Cape May.....									1.22			42.685
Cumberland.....												1.220
Essex.....		113.019	1.284									114.303
Gloucester.....	37.08	4.76					3.594		44.985			85.659
Hudson.....												4.76
Hunterdon.....	31.276		2.196									33.472
Mercer.....	125.372	5.32	7.11		1.879				21.059			137.802
Middlesex.....	125.927	5.85	10.095						60.098		7.36	164.810
Monmouth.....	57.000	1.76			6.585							126.218
Morris.....	66.385	0.75	2.938						59.022			76.658
Ocean.....						2.786						59.022
Passaic.....	62.239		0.789									65.814
Salem.....	5.200							1.286	17.416	13.36		37.262
Somerset.....		84.715	4.482									89.197
Sussex.....	9.553	1.500	3.278		7.327							14.331
Union.....	16.781		4.857									28.965
Warren.....	35.92	10.96	8.587									55.467
Total.....	775.807	288.679	50.33	2.437	26.121	2.786	3.594	1.286	406.636	13.36	7.36	1578.396

Note: This represents less than one-third of the cost of State aid roads, as counties pay two-thirds of cost and the entire cost of culverts and bridges.

New Mexico

Funds Available 1912.—On the 30th of March we had in the good roads fund \$21,971.09 and on deposit in the depositories, \$5,849.12. Our taxes will amount to probably \$50,000 or \$60,000 this year for road purposes, that is the 1 mill levy, you understand, on our property. You can readily see that New Mexico is only doing a little work on roads, but a very large development in comparison with past work. We are building little pieces of road all over the State with great success, and if we can get the means we will undoubtedly develop some main trunk line system. The legislature is now in session and it is quite possible the State will bond. County bonds or some other means to derive revenue will be secured.

C. D. MILLER,
State Engineer.

Mileage.—

	Miles
Roads completed 1911.....	182
Roads under construction.....	101
Roads surveyed.....	128
Roads inspected.....	193
Total.....	604

Bulletin 41, U. S. Office of Public Roads, gives the total mileage 16,920 of which 25 miles were stone, 8 miles gravel and 71 miles were sand-clay, at the close of 1909.

New York

Funds Available 1912.—We have \$23,000,000 available for 1912 construction.

C. GORDON REEL,
Superintendent.

Bonds Voted 1911.—

Onondaga.....	\$60,000
Orange.....	189,000
Rensselaer.....	150,000
Saratoga.....	44,000
Seneca.....	14,595
Westchester.....	104,000
Albany.....	97,000
Chemung.....	37,530
Erie.....	325,000
Franklin.....	500,000
Greene.....	40,000
Herkimer.....	108,000
Nassau.....	46,000
Orleans.....	38,000

Putnam.....	18,000
St. Lawrence.....	50,000
Steuben.....	60,000
Warren.....	50,000
Wyoming.....	22,000
Total.....	\$1,953,125

Mileage.—

YEAR	MILES IMPROVED	STATE AID APPROPRIATIONS
1898		\$50,000.00
1899	5.5	50,000.00
1900	25.86	150,000.00
1901	27.97	420,000.00
1902	97.37	795,000.00
1903	115.75	600,000.00
1904	158.00	1,108,265.00
1905	117.00	50,000.00
1906	94.00	5,000,000.00
1907	311.00	3,000,000.00
1908	809.00	3,000,000.00
1909	520.00	5,000,000.00
1910	543.00	7,904,023.94
1911	540.00	9,494,537.20
Total.....	3364.45	

North Carolina

Funds Available 1912.—The State of North Carolina makes an annual appropriation of \$5000 to be expended through the geological and economic survey for advising with township and county authorities in the building and improvement of the public roads. The State has passed special laws by which convicts, instead of being sentenced to the State prison, are sentenced direct to work on the public roads from the superior court, and a large number of the counties in the State are using convicts for this purpose.

JOSEPH HYDE PRATT,
State Geologist.

Bonds 1911.—

COUNTY	BONDS VOTED DURING 1911	BONDS SOLD DURING 1911	KIND OF BONDS
Bertie.....	\$20,000		Township
Brunswick.....		\$50,000	Township
Cabarrus.....		40,000	County
Cherokee.....		50,000	Township
Cleveland.....		25,000	Township
Duplin.....		10,000	Township
Franklin.....	70,000	70,000	Township
Hoke.....	50,000	50,000	County
Iredell.....	400,000	125,000	County
Madison.....	10,000	10,000	Township
Martin.....		15,000	Township
Moore.....	10,000	10,000	Township
Nash.....	60,000		Township
New Hanover....	50,000	50,000	County
Polk.....	12,000	12,000	Township
Sampson.....	5,000		County
Scotland.....	50,000		Township
Total.....	\$737,000	\$517,000	

Mileage.—

Public roads in North Carolina.....	49,235
Macadam.....	1,175
Macadam constructed during 1911.....	187
Sand-clay road.....	1,602
Sand-clay road constructed in 1911.....	619
Gravel road.....	1,183
Gravel road constructed during 1911.....	297
Specially surfaced road.....	89.5
Specially surfaced road constructed during 1911.....	59.5
Dirt roads graded during 1911.....	491
Improved roads in North Carolina.....	4,540.5
Improved during 1911.....	1,653.5
Unimproved roads.....	44,694.5

North Dakota*Bonds Voted 1911.—*

Sheridan, County.....	\$3,200
District.....	3,200
Township.....	1,500
City.....	3,500
Total.....	\$11,400

Mileage.—The total road mileage at the close of 1909 was 61,593 of which 7 miles were stone and 140 miles gravel, according to

Bulletin 41, U. S. Office of Public Roads. State Engineer reports total of 161 miles improved roads at close of 1911.

Expenditures.—The total amount expended on the roads of the State, outside of incorporated cities and towns, for the year 1911, was \$691,540.

Ohio

Funds Available 1912.—In our State at least 50 per cent of the cost of construction must be paid by the county in which the road is located, which makes the total amount expended through this department at least double the amount appropriated by the State. The amount of money available from the State is as follows: unexpended balance, \$372,246.33; appropriated from general revenue fund, \$440,000; available from automobile license fund, \$220,000; total \$1,032,246.33.

JAMES R. MARKER,
State Highway Commissioner.

Bonds Voted 1911.—

Clark.....	\$12,000
Crawford.....	10,000
Cuyahoga.....	845,275
Darke.....	40,000
Franklin.....	441,700
Geauga.....	20,000
Hancock.....	50,500
Hardin.....	96,350
Licking.....	117,000
Logan.....	15,000
Lucas.....	22,376
Madison.....	6,500
Mahoning.....	125,000
Marion.....	175,800
Mercer.....	36,500
Montgomery.....	10,000
Morrow.....	25,272
Ottawa.....	61,000
Paulding.....	172,750
Portage.....	99,000
Putnam.....	6,000
Ross.....	59,000
Sandusky.....	101,500
Summit.....	71,750
Union.....	45,500
Van Wert.....	164,960
Williams.....	2,000
Wood.....	220,000
Wyandot.....	45,400
Total.....	\$3,098,133

*1906 to November 15, 1911**Mileage.—*

	Miles let
1906.....	8.63
1907.....	33.08
1908.....	29.45
1909.....	63.01
1910.....	72.67
1911.....	60.88
Total.....	267.72

	Miles completed
1907.....	5.98
1908.....	24.79
1909.....	28.56
1910.....	47.70
1911.....	60.83
Total.....	167.86

This leaves 99.86 miles which are not completed. Pages 63 and 64 of the Sixth Annual Report show a table which gives the amounts paid for repairs and new construction.

State aid appropriation

YEAR	TOTAL FOR STATE	AMOUNTING PER COUNTY TO
1905	\$10,000	\$113.63
1906	150,000	1,704.54
1907	150,000	1,704.54
1908	440,000	5,000.00
1909	440,000	5,000.00
1910	440,000	5,000.00
1911	440,000	5,000.00

Automobile licenses

1909	46,577.75	529.29
1910	124,000.00	1,348.34
1911	190,711.79	1,822.34
1912 (estimate)	275,000.00	

Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 88,861 of which 231 miles were brick, 9687 miles stone and 14,188 miles gravel.

Oklahoma

Bonds Voted 1911.—

Stephens.....	\$ 27,500
Wagoner.....	7,000
Choctaw.....	120,000
Tulsa.....	50,000
Grady.....	20,000
Canadian.....	100,000
Osage.....	150,000
Total.....	\$474,500

Mileage.—At the close of 1909 the total mileage of public roads was 71,325 of which 23.5 were stone, 141.5 were gravel, and 196 miles sand-clay, according to Bulletin 41, U. S. Office of Public Roads.

Oregon

Funds Available 1912.—Appropriation of \$75,000.

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage of public roads at the close of 1909, 29,474 of which 451 miles were stone, 1871 miles gravel and 345 miles sand-clay.

Pennsylvania

Funds Available 1912.—The legislature of 1911 appropriated the sum of three million dollars for carrying on the work of the department in its reconstruction, maintenance and repair of State highways; and the sum of \$1,000,000 for the purpose of Stateaid, which money shall remain for the use of the department until the same is entirely used or applied to the purpose for which it was appropriated. At the Legislative session (1911) a resolution was adopted and will be voted upon by the people in 1912 to the effect that the constitution be so changed as to enable bonds to be issued in the sum of \$50,000,000 for road purposes.

L. F. NEEFE,
Chief Clerk.

Bonds Voted 1911.—

Beaver.....	\$20,000
Clinton.....	99,000
Montgomery.....	35,000
Allegheny.....	1,025,000
Philadelphia.....	35,000
Washington.....	500,000
Lackawanna (sold 1911).....	250,000
Total.....	\$1,964,000

Mileage and Cost.—

YEAR	MILES STATE AID ROAD CONSTRUCTED	COST OF CONSTRUCTION
1904	9.25	\$80,729.96
1905	68.40	579,693.50
1906	97.30	910,665.12
1907	151.26	1,767,114.25
1908	239.44	2,966,245.04
1909	163.52	1,920,552.34
1910	73.88	919,531.98
1911	33.88	433,428.59
Total.....	836.85	\$9,577,960.78

Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 87,387 of which 2891 miles were macadam, 29 miles brick and 436 miles gravel.

Rhode Island

Funds Available 1912.—Amount available for State road and State aid road work during the calendar year 1912, \$600,000 in bonds, \$250,000 appropriation, and about \$90,000 from automobile law.

PETER J. LANNON,
Clerk.

State Bonds.—In the year 1905 at the annual election in November the people voted to authorize the general treasurer, of the State, to issue State highway bonds to the amount of \$600,000 to be used for the construction of State highways. In the year 1908 the same vote was passed for \$600,000 highway bonds and November, 1911, another bond issue was voted authorizing \$600,000 for State highways, making in all \$1,800,000 in bonds.

Mileage.—

YEAR	MILES BUILT	STATE AID APPROPRIATIONS
1903	16.6	\$100,000.00
1904	18.5	100,000.00
1905	17.4	125,000.00
1906	35.1	25,000.00*
1907	32.6	30,000.00†
1908	35.8	80,000.00
1909	32.0	‡
1910	34.6	30,000.00§
1911	00.0	82,764.20¶
Total.....	222.6	

* Available from bonds, \$200,000.

† Available from bonds, \$400,000.

‡ Available from bonds, \$300,000.

§ Available from bonds, \$300,000.

¶ Income from autos (used for maintenance).

In addition to the above, 28 miles of macadam on State system that had previously been built by the towns were resurfaced by the State and are now being maintained by the State, making a total of 250.6 miles cared for by the State aid.

South Carolina

Bonds Voted 1911.—

Lexington.....	\$20,000
Greenville.....	15,000
Richland (Columbia township).....	75,000
York.....	14,000
Total.....	\$124,000

Mileage.—The report of State commissioner of agriculture for 1911 gives mileage data upon which the following table of mileage at close of 1911 is based.

	Miles
Stone surfaced roads.....	111
Gravel roads.....	427
Sand-clay roads.....	4,528
Shell roads.....	62
	5,128
Total Mileage.....	47,885

South Dakota

Funds Available 1912.—It is impracticable to state with any degree of accuracy the amount of cash revenue available for public roads in South Dakota during 1912. Some figures have been obtained from fifteen counties in the State, and from these figures a rough estimate may be obtained. The information furnished this office concerning the amount of money available for public roads in this State during 1912, by the fifteen counties above mentioned is to the effect that the sum of \$319,000 will be used for roads and bridges during the present year. For the remaining forty-five counties in the State it is probable that the sum of about \$700,000 will be available, making a total of something over \$1,000,000 to be expended on public roads and bridges in this State during the present year.

Mileage.—With regard to the approximate mileage of each type of road in South Dakota at the close of 1911, there are no authentic figures available. It is safe to say that about 50,000 miles of road existed in South Dakota at the time designated. Practically the entire mileage comprises earth roads. There are not over 100 miles of hard surfaced highways in the State.

SAMUEL H. LEA,
State Engineer.

Tennessee

Bonds Voted 1911.—

Cumberland.....	\$40,000
Davidson.....	92,933
Marion.....	115,000
Hickman.....	24,500
Warren.....	12,000
McMinn (bridges).....	25,000
McMinn.....	300,000
Wayne.....	15,000
Blount (issued).....	300,000
Carter.....	60,000
Grainger (issued).....	100,000
Hamilton.....	665,000
Putnam.....	100,000
Robertson (issued).....	150,000
Monroe.....	300,000
Loudon.....	100,000
Roane.....	100,000
Smith.....	30,000
Sumner.....	200,000
White.....	90,000
Washington.....	60,000
Sullivan.....	200,000
Total.....	\$3,079,433

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 45,913 of which 2684 miles were stone, and 2543 miles gravel.

Texas

Funds Available 1912.—1. Each county levies an ad valorem tax for road construction and maintenance. The commissioners court may levy not to exceed 15 cents on the \$100 at their own discretion, and by a majority vote at a special election, the court may be authorized to levy not to exceed an additional 15 cents or a total of 30 cents. I think we are safe in estimating the average rate \$2,600,000,000 which would produce \$3,900,000.

2. A large number of bond elections already have been carried in 1912 and quite a good deal of the bonds authorized in 1911 are available for use this year. Still other elections are ordered in time to allow the proceeds to become available in 1912. I think that \$6,000,000 from this source for 1912 is a very conservative estimate.

3. All able bodied men between the ages of twenty-one and forty-five years, who do not reside in an incorporated town or village and pay a street tax, are subject to five days road duty. This can be commuted by a cash payment of \$3 prior to the first of February.

Hence, I will estimate its value at \$3 for the five days. I estimate 250,000 men subject to this road tax of \$3 which would then amount to \$750,000.

The summary would then show:

Proceeds from regular road and bridge tax levied by counties.....	\$3,900,000
Bond issues by counties and districts.....	6,000,000
Cash value of the labor tax.....	750,000
Total.....	\$10,650,000

ROBERT J. POTTS,
Department of Civil Engineering.

Bonds Voted 1911.—The Texas Commercial Secretaries' and Business Men's Association has compiled statistics showing bond issues in the various counties of Texas during the year 1911, information for such statistics being obtained from county judges.

It is developed that bond issues to the amount of \$8,915,500 were voted on and successfully carried in Texas counties during the year ending December 31, 1911, which is more than twice as great as the sum voted for this purpose the preceding year.

The amount of funds on hand January 1, 1911, raised by appropriations and issues of bonds prior to that date, was \$2,589,456.45 making a total of \$11,504,456 available for road construction for the year subsequent to the sale of bonds.

During February of this year, bond elections were voted on and successfully carried in twelve counties of Texas covering a total of \$2,250,000.

The following table contains the counties holding bond elections in 1911 and the amount of road funds on hand, January 1, 1911:

COUNTY	AMOUNT OF BONDS	AMOUNT ON HAND JANUARY 1, 1911
Anderson.....	\$150,000.00	\$5,000.00
Angelina.....	200,000.00	
Arkansas.....		4,000.00
Archer.....		2,000.00
Armstrong.....	1,500.00	2,000.00
Austin.....	175,000.00	12,000.00
Vandera.....		4,000.00
Baylor.....	100,000.00	
Bee.....		125,000.00
Bosque.....	40,000.00	
Bowie.....	500,000.00	
Brazoria.....	100,000.00	100,000.00
Brazos.....		20,000.00
Brown.....		60,000.00
Caldwell.....	225,000.00	75,000.00

COUNTY	AMOUNT OF BONDS	AMOUNT ON HAND JANUARY 1, 1911
Calhoun.....	\$100,000.00	
Cameron.....	15,000.00	
Clay.....	200,000.00	
Coke.....		\$1,700.00
Coleman.....		14,000.00
Colorado.....		8,000.00
Concho.....		2,600.00
Crosby.....	6,000.00	4,000.00
Dallam.....		3,500.00
Dallas.....	500,000.00	
Delta.....		1,200.00
Denton.....	75,000.00	600.00
De Witt.....		900.00
Dickens.....		2,300.00
Ellis.....		555,000.00
El Paso.....	250,000.00	50,000.00
Fort Bend.....	60,000.00	150,000.00
Freestone.....	34,000.00	
Frio.....		12,000.00
Glasscock.....		2,000.00
Goliad.....		4,000.00
Gray.....		3,000.00
Grayson.....	400,000.00	237,696 45
Gregg.....	200,000.00	
Grimes.....	125,000.00	
Guadalupe.....		32,000.00
Hall.....	65,000.00	6,000 00
Hardin.....	135,000.00	
Harris.....		100,000.00
Haskell.....	75,000.00	
Hill.....		20,000.00
Hood.....		26,000.00
Houston.....	174,000.00	
Howard.....	10,000.00	
Iron.....		2,000 00
Jack.....		5,000.00
Jackson.....	100,000.00	239,760.00
Kent.....		1,500.00
Kerr.....		6,000.00
King.....		10,000.00
Kinney.....		6,000.00
Lamar.....	\$300,000.00	11,000.00
Lampasas.....	6,000.00	12,000.00
Lavaca.....		3,100.00
Leon.....	214,000.00	9,000.00
Liberty.....	250,000.00	
Limestone.....	150,000.00	
Llano.....		25,000.00
Lubbock.....		3,300 00
Matagorda.....		20,000.00
Maverick.....	7,000.00	
McCulloh.....	75,000.00	43,000.00
McMullen.....	35,000.00	1,000.00
Medina.....		10,000.00

COUNTY	AMOUNT OF BONDS	AMOUNT ON HAND JANUARY 1, 1911
Menard.....	\$20,000.00	
Mills.....		\$3,600.00
Mitchell.....		33,000.00
Morris.....		4,000.00
Nacogdoches.....		12,000.00
Newton.....	500,000.00	
Nolan.....	100,000.00	10,000.00
Orange.....	200,000.00	7,000.00
Palo Pinto.....		16,000.00
Panola.....		3,100.00
Parmer.....		500.00
Potter.....		12,500.00
Rains.....		2,500.00
Refugio.....		12,000.00
Robertson.....	100,000.00	
Runnels.....		9,000.00
Rusk.....	50,000.00	
Sabine.....		2,000.00
San Patricio.....		112,000.00
Shelby.....		12,000.00
Tarrant.....	1,600,000.00	15,400.00
Taylor.....		151,000.00
Travis.....		2,000.00
Upshur.....		4,500.00
Upton.....		4,500.00
Uvalde.....		2,000.00
Val Verde.....		16,000.00
Victoria.....	50,000.00	
Waller.....		10,000.00
Ward.....		4,000.00
Washington.....	300,000.00	
Wharton.....	300,000.00	
Wichita.....	150,000.00	
Williamson.....	100,000.00	
Wood.....	30,000.00	
Zavala.....	23,000.00	
Total.....	\$8,915,500.00	\$2,589,456.45

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 128,971 of which 365 miles were stone, 2126 miles gravel and 2254 miles sand-clay.

Utah

Funds Available.—State roads commission created by law March 23, 1909. First appropriation \$27,000. No roads built in 1909; 125.4 miles graded and improved at a total cost of \$100,631, of which the State paid the sum of \$54,000 or the State appropriation for 1909 and 1910. The nearest I could find out what the amount will be available for roads in 1912, is as follows:

Five mill tax on each county about.....	\$18,000.00
The regular county appropriation about.....	50,000.00
Balance of a bond issue that was passed at the legisla- ture 1911 will be about.....	180,000.00

Total approximate about..... \$250,000.00

CALEB TANNER,
Secretary State Road Commission.

Bonds Voted 1911.—Boxelder, \$200,000.

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 8320, of which 42 miles were stone, 332 miles gravel and 643.5 miles sand-clay.

Vermont

Funds Available 1912.—For ordinary repair work by the towns under their own supervision a minimum tax of 20 per cent on the grand list. This means a minimum of \$400,000. This has nothing to do with the State road proposition. The State road money, or rather money available for permanent improvements on the selected highways of the State, is derived as follows: A State tax on the grand list of the towns of 5 per cent, \$100,000; State aid appropriation, \$150,000; voted by the towns to take advantage of last item, \$100,000; total for construction purposes \$350,000; from the registrations of autos, approximately, which is used for maintenance of highways under State supervision, \$65,000. Total money expended under State supervision, \$415,000. M. E. CHEDD,
Clerk.

Mileage.—

YEAR	MILES IMPROVED	STATE AID APPROPRIATIONS
1898		Law passed.
1899	133.0	\$87,774.27*
1900	124.0	87,257.17*
1901	} Not given {	88,621.81*
1902		89,507.50*
1903	92.8	90,329.63*
1904	139.2	130,811.37*†
1905	93.7	113,493.99*†
1906	72.0	97,701.93*†
1907	97.9	50,000.00+† 98,615.27*
1908	118.4	50,000.00+† 102,961.95*
1909	132.3	75,000.00+† 105,458.23*
1910	140.0 (est.)	75,000.00+† 102,633.36*
1911	182.67	150,000.00+† 103,387.97*

* Five per cent State tax.

† Sum of 5 per cent State tax and special license revenue.

‡ Direct State appropriation.

Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 14,406 of which 467 miles were stone and 2184 miles gravel.

Virginia

Funds Available 1912.—We have available for 1912, for maintenance of convict labor \$85,000, and for State money aid to the counties which do not get the benefit of the convict labor \$180,000, and in addition thereto the automobile tax, which will amount to about \$45,000. The \$85,000 will enable us to maintain convict road forces in sixteen counties, leaving seventy-nine counties that have made application to share in the \$180,000 and the automobile tax. These figures do not include about \$60,000 of 1911 money, which will be expended this year. There have been issued about \$4,000,000 of bonds but it is hard to say what portion of this will be expended in 1912. This State money aid has to be met by the counties with an equal amount, and in the case of the convict labor, the State furnishes that labor free to the counties and the counties pay all other expenses in connection with the road construction.

P. ST. J. WILSON,
Commissioner.

Bonds Voted 1911.—

Amherst.....	\$135,000
Fauquier.....	75,000
Lee.....	364,000
Mecklenburg.....	240,000
Russell.....	275,000
Smyth.....	100,000
Spottsylvania (districts).....	10,000
Pulaski (districts).....	70,000
Page (districts).....	26,000
Tazewell.....	625,000
Warren.....	30,000
Wise.....	700,000
Total.....	\$2,650,000

Mileage.—

YEAR	MILES BUILT	STATE AID APPROPRIATIONS	
		Money aid	Convict labor
1906 }	24		\$25,000
1907 }			25,000
1908	52		85,000
1909	138	\$250,000.00	65,000
1910	290	170,669.86	70,000
1911*	342	235,575.94	70,000

* Also 54 miles of grading in Wise County.

The mileage does not coincide exactly with the appropriation for the reason that, first, our fiscal year (the time at which our reports are made) ends September 30, whereas the appropriation year ends on March 1; so that, for instance, the appropriations made for the fiscal years 1906 and 1907 ended March 1, 1908. The annual report for 1907, which was our first annual report, reported work done from July 1, 1906, to September 30, 1907. The appropriation of \$50,000 for these two years was extended to the first of March, 1908, and the appropriation shown for each year after that was to cover the period from the first of March of the year given to the first of March of the following year. There still remains unexpended of the last appropriation for State money aid about \$75,000. There has been put in bridges \$65,000. These two are probably offset by work done in the counties that have issued bonds for road improvement, which work has been done under our supervision and is included in our reports, but one-half the cost of which has not been paid out of the State aid. P. ST. J. WILSON.

Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 43,399 of which 1011 miles were stone, 611 miles gravel and 185 miles sand-clay.

Washington

Funds Available 1912.—Our fiscal year terminates with the biennum April 1, 1913, and for the thirteen months March 1, 1912, to April 1, 1913, our books show that there will be available for expenditures as follows: State roads, bridges and highway commissioner's office, \$170,900; permanent highways, \$897,700; State quarries, \$24,800; total, \$1,093,400. W. J. ROBERTS,

Highway Commissioner.

Bonds Voted 1911.—

Pacific.....	\$100,000
Skagit.....	225,000
Total.....	\$325,000

Mileage.—

YEAR	MILES IMPROVED	STATE AID APPROPRIATIONS
1905 }	10.7	144,000*
1906 }		
1907 }	35.5	225,000*
1908 }		135,000†
1909	80.6	620,000*
1910	55.3	595,000†
1911		

* State roads.

† State aid roads.

Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 34,284 of which 101 miles were stone, 3179 miles gravel and 1224 miles sand-clay.

West Virginia

Bonds Voted 1911.—

Cabell.....	\$300,000
Wood.....	180,000
Summers.....	105,000
Hancock.....	125,000
Total.....	\$710,000

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 32,109 of which 544 miles were stone and 34 miles were gravel.

Wisconsin

Funds Available 1912.—Total to be spent in State aid work in 1912 is \$1,000,000 for road construction and \$150,000 for bridge construction. It is expected to build about 650 miles of all classes of roads, and 150 bridges practically, all small. This work will extend into 530 towns and in 65 counties out of 71 in the State. This is believed to be the largest operations in the first year of any State aid work.

A. R. HIRST,
State Highway Engineer.

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 61,090 of which 659 miles were stone, 8494 miles gravel and 1013 miles sand-clay.

Wyoming

Revenues.—A State appropriation of \$10,000 was made in 1911 for purchase of tools and equipment for working State prisoners on roads. The annual expenditure for the State for road purposes is about \$510,000.

Mileage.—Bulletin 41, U. S. Office of Public Roads, gives the total mileage at the close of 1909, 10,569 with 416 miles improved.

Summary

Funds Available 1912.—Owing to the fact that some of the States reporting amounts available for 1912 included only State appropriations, others both State and local appropriations, while some of

the reports included estimates of value of convict and statute labor and some left out such estimates, and the further fact that in some cases bond issues were included in their entirety while in others only an estimated expenditure was given, it is deemed unwise to attempt a summary of the individual reports on "Funds Available 1912." The individual reports are intelligently given by competent authorities, and there should be no difficulty in understanding from them the conditions in each State.

Bonds Reported as Voted by Counties and Townships 1911.

Alabama.....	\$1,135,000.00
Arkansas.....	130,000.00
California.....	2,295,000.00
Delaware.....	200,000.00
Florida.....	310,000.00
Georgia.....	230,000.00
Idaho.....	38,795.50
Illinois.....	45,000.00
Indiana.....	513,754.00
Iowa.....	431,600.00
Kansas.....	697,234.80
Kentucky.....	21,500.00
Louisiana.....	60,000.00
Maryland.....	1,559,000.00
Michigan.....	3,657,000.00
Minnesota.....	60,000.00
Mississippi.....	660,000.00
Missouri.....	804,000.00
Montana.....	312,500.00
Nebraska.....	101,000.00
Nevada.....	10,000.00
New Jersey.....	1,173,100.00
New York.....	1,953,125.00
North Carolina.....	737,000.00
North Dakota.....	11,400.00
Ohio.....	3,098,133.00
Oklahoma.....	474,500.00
Pennsylvania.....	1,964,000.00
South Carolina.....	124,000.00
Tennessee.....	3,079,433.00
Texas.....	8,915,500.00
Utah.....	200,000.00
Virginia.....	2,650,000.00
Washington.....	325,000.00
West Virginia.....	710,000.00
Total.....	\$38,686,575.30

Mileage.—It is not considered advisable to summarize the mileage of improved roads at the close of 1911 for the reason that the information is not complete for all of the States. Bulletin 41, of the U. S. Office of Public Roads gives the mileage at the close of 1909 as follows:

Total Mileage.....	2,199,645.14
Stone surfaced roads.....	59,237.35
Gravel roads.....	102,870.44
Other materials.....	28,372.52
	190,476.32
Unimproved.....	2,009,168.84

**Mileage and Cost of Public Roads in the United States in 1909—
Summary of Bulletin 41, U. S. Office of Public Roads**

Statistics on road mileage

	1904	1909
Total mileage of all public roads in U. S..	2,151,379	2,199,645
Total mileage of all improved roads in U.S.	153,530	190,476
Percentage of all roads improved.....	7.14	8.66
Total mileage of stone roads in U. S.....	36,818	59,237
Total mileage of gravel roads in U. S.....	109,905	102,870*
Total mileage of sand-clay, brick, bitumi- nous-macadam and other improved road in U.S.	6,806	28,372

States having largest mileage of improved roads

	1904	1909
	<i>miles</i>	<i>miles</i>
Indiana.....	23,877	24,955
Ohio.....	23,460	24,106
New York.....	5,876	12,787
Wisconsin.....	10,633	10,167*
Kentucky.....	9,486	10,114
Illinois.....	7,924	8,914
California.....	8,803	8,587
Massachusetts.....	7,843	8,463

* Decrease caused by reclassification of roads.

States which have made the greatest progress in road building in the five-year period

	MILES OF IMPROVED ROADS		GAIN
	1904	1909	
New York.....	5,876	12,787	6,911
Georgia.....	1,634	5,978	4,344
Washington.....	1,976	4,520	2,544
Missouri.....	2,733	4,755	2,022
South Carolina.....	1,878	3,534	1,656
Alabama.....	1,720	3,263	1,543
Pennsylvania.....	2,160	3,364	1,194
Tennessee.....	4,285	5,353	1,068
New Jersey.....	2,422	3,377	955
Florida.....	885	1,752	866
Maryland.....	1,570	2,142	572

The gain in New York State is due largely to the fact that the State has bonded itself for \$50,000,000, and that \$5,000,000 a year is being expended by the State, in addition to an equal sum by the counties, in building State highways.

The gain in Georgia is largely attributed to the use of 4500 prisoners on the public roads of the State.

The gain in South Carolina, Alabama and Florida is due largely to the fact that sand-clay roads are being built and that this is a very cheap and satisfactory type of road building.

Estimated cost of improved roads in the United States based on data contained in Bulletin no. 41

ROADS	MILEAGE	AVERAGE COST PER MILE	TOTAL ESTIMATED COST IN U. S.
Stone.....	59,237	4,989.00	\$295,533,393.00
Gravel.....	102,870	2,047.00	210,574,890.00
Sand-clay.....	24,601	723.00	17,786,533.00
Miscellaneous (B. Mac. Brick, etc).....	3,771	10,000.00	37,710,000.00
Grand total.....	190,479		\$561,604,806.00

OFFICE OF PUBLIC ROADS OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

The office of road inquiry was established under authority of an act of Congress approved March 3, 1893, making an appropriation of \$10,000 to enable the Secretary of Agriculture to make inquiries in regard to systems of road management throughout the United States, investigations in regard to the best methods of road making, to prepare publications on this subject, and assist agricultural colleges and experiment stations in disseminating information. In 1897 the item was amended by authorizing investigation of road making materials in the various States. In 1899 the name of the office was changed from "Road Inquiry" to "Public Road Inquiries." In 1902 the bill was amended so as to provide for investigations of the chemical and physical character of road materials. In 1905 the name of the office was changed to "Office of Public Roads." In the appropriation bill for 1909 the rent or purchase of road making machinery was forbidden. The following is a table of appropriations from the establishment of the office to the fiscal year 1912.

Appropriations from 1893-94 to 1911-12

1893-4.....	\$10,000	1904-5.....	\$ 35,000
1894-5.....	10,000	1905-6.....	50,000
1895-6.....	10,000	1906-7.....	70,000
1896-7.....	8,000	1907-8.....	70,050
1897-8.....	8,000	1908-9.....	87,390
1898-9.....	8,000	1909-10.....	116,460
1899-1900.....	8,000	1910-11.....	114,240
1900-1.....	14,000	1911-12.....	160,720
1901-2.....	20,000		
1902-3.....	30,000	Total.....	\$864,960
1903-4.....	35,000		

Since its establishment the office has issued about two hundred publications, including bulletins, circulars, farmer's bulletins, and annual reports, and has directed the construction of upwards of four hundred object lesson and experimental roads, illustrating various methods of construction for the purpose of instructing local road builders, stimulating sentiment for road improvement and introducing adequate types and correct methods of road construction. The office sends out its engineers and experts to give

lectures and addresses and to confer with State and local officials on all phases of the road subject. Testing and research laboratories are maintained for the purpose of determining the suitability and relative value of the various materials for road building. A great deal of experimental work is conducted with bituminous and other binders, concrete and various special materials and methods.

In order to secure the engineering and expert advice or supervision from the office of public roads, an application should be made to the director of that office, by the local authorities having jurisdiction over the roads sought to be improved. If it is desired that road materials be tested in the laboratories of the office of public roads, application should be made to the director of that office, for shipping instructions, and blank forms for description of the material. The assistance given by the office of public roads is free to local communities and citizens of the United States, where the object sought is of benefit to the public. The publications of the office may be obtained upon request. The office occupies the entire building at 14th and B Streets S. W., Washington, D. C.

HIGHWAY ENGINEERING IN EDUCATIONAL INSTITUTIONS.⁴⁸

Memorandum of courses in highway engineering given as a part of the general course in civil engineering in universities and colleges in the United States. This does not include closely allied courses in bridges and in concrete work. The first column shows the number of periods per week; the second shows the semesters or terms covered by the course. Institutions requiring less than the usual four years or 14 units for admission to the civil engineering course are noted by a star.

INSTITUTION	PERIODS ⁴⁹	SEMESTERS OR TERMS
*Alabama Polytechnic Institute		
Roads and pavements.....	5	1½ terms
(Also part of the time of four weeks summer camp.)		
University of Alabama		
Highway construction.....	3	1 semester
Road economics.....	3	1 semester
Road materials (Laboratory).....	2	1 semester
(Part of a four years course leading to B.S. in highway engineering.)		
*University of Arkansas		
Highways.....		1 term
University of California		
Highway engineering.....	2	1 semester
Railway, highway and canal surveying.....	2	1 semester
Throop Polytechnic Institute		
Highway engineering.....	3	1 semester
University of Southern California		
Highway engineering.....	2	1 semester
Colorado State Agricultural College		
Highway construction.....	2	1 semester
University of Colorado		
Roads and pavements.....	1	½ semester
Sheffield Scientific School, Yale		
Railway and highway engineering.....	6	1 term
Roads and pavements.....	1	1 term
Delaware College		
Highways.....	1	1 semester

⁴⁸ Prepared by Bureau of Education, U. S. Department of the Interior.

⁴⁹ The length of a "period" in educational institutions is usually one hour, while the length of the "semester" or term varies, some institutions dividing the college year into three terms and some into two terms.

INSTITUTION	PERIODS	SEMESTERS OR TERMS
George Washington University		
Highways and pavements.....	2	1 term
Howard University		
Highway and railroad location	3	2 semesters
*University of Florida		
Municipal engineering (roads and pavements)	6	1 semester
University of Georgia		
Road engineering.....	5	1 semester
University of Idaho		
Roads and pavements.....	2	1 semester
Armour Institute of Technology		
Roads, streets, and pavements.....	5	1 semester
University of Illinois		
Roads and pavements.....	2	1 semester
James Millikin University		
Roads and pavements.....	1	1 semester
University of Notre Dame		
Roads and pavements.....	4	1 term
Purdue University		
Roads and pavements.....	2	$\frac{1}{2}$ term
Rose Polytechnic Institute		
Roads, streets, and pavements.....	1	1 term
Iowa State College		
Roads and pavements.....	2	1 semester
State University of Iowa		
Highways.....	3	1 semester
*Kansas State Agricultural College		
Highway engineering.....	2	1 term
University of Kansas		
Roads and pavements.....	2	1 term
State University of Kentucky		
Highway engineering.....	3	1 term
*Louisiana State University		
Topographic and hydrographic roads and pavements.....	4	1 term
Tulane University		
Railroad and highway engineering	2	1 term
University of Maine		
Highway engineering.....	3	$\frac{2}{3}$ semester
*Maryland Agricultural College		
Highway engineering.....	4	1 term
Massachusetts Institute of Technology		
Highway engineering.....	1	1 term
Harvard University		
Road engineering.....	3	$\frac{1}{2}$ semester
Tufts College		
Chemistry of road-building materials.....	3	2 terms
Highways and cements.....	2	1 term
Worcester Polytechnic Institute		
Highway construction.....	3	1 semester
Michigan Agricultural College		
Pavements.....	2	1 term
Road construction.....	5	1 term

INSTITUTION	PERIODS	SEMESTERS OR TERMS
University of Minnesota		
Highways and pavements.....	3	1 semester
*Mississippi Agricultural College		
Highway engineering.....	4	1 term
University of Mississippi		
Highway construction.....	3	1 term
University of Missouri		
Roads and pavements.....	2	1 semester
Washington University		
Roads, streets, and pavements.....	2	1 semester
University of Montana		
Roads and pavements.....	2	1 semester
University of Nebraska		
Roads, streets, and pavements.....	2	1 semester
Dartmouth College		
Roads, railroads, and transportation in general.....	20 half days	
Rutgers College		
Highway and sanitary engineering.....	3	1 term
New Mexico College of Agriculture and Mechanic Arts		
Roads and pavements.....	3	1 semester
Columbia University		
Highway engineering.....	2	1 semester
Complete Graduate Course.....	—	—
New York University		
Highway engineering.....	2	1 term
Brooklyn Polytechnic Institute		
Highway engineering.....	2	1 semester
Rensselaer Polytechnic Institute		
Road engineering.....	—	—
Syracuse University		
Roads, streets, and pavements.....	1	1 term
Union College		
Highways, streets, and pavements.....	4	1 term
*North Carolina Agricultural and Mechanical College		
Road-building.....	1	3 terms
(Four-years course in road engineering)		
Road construction, drainage, and location.	2	2 semesters
Road management.....	1	2 semesters
Soil surveying and rocks for road construction.....	1	2 semesters
North Dakota Agricultural College		
Roads and pavements.....	4	1 term
Case School of Applied Science		
Highway engineering.....	5	$\frac{1}{2}$ term
Ohio State University		
Roads and streets.....	3	1 semester
*Oklahoma Agricultural and Mechanical College		
Roads and pavements.....	3	1 term

INSTITUTION	PERIODS	SEMESTERS OR TERMS
University of Oklahoma		
Roads and pavements.....	3	1 semester
*Oregon Agricultural College		
Highway construction.....	3	1 semester
Highway laboratory.....	1	1 semester
Lafayette College		
Roads and pavements.....	2	1 term
University of Pennsylvania		
Roads and pavements.....	1	1 semester
University of Pittsburgh		
Roads and pavements.....	3	1 term
Pennsylvania State College		
Highway engineering.....	2	1 semester
Roads and trails.....	2	1 semester
Highway engineering and land grading.....	5	1 semester
Highway materials (laboratory).....	2	1 semester
Highway design.....	1	1 semester
Highway design (laboratory).....	3.6	1 semester
Test of road materials (laboratory).....	.8	1 semester
Rhode Island State College		
Roads and pavements.....	4	1 term
Brown University		
Highway engineering.....	3	1 term
*University of South Carolina		
(Special two-years course in highway construction)		
Roads and pavements.....	3	1 term
Special practice work in the field.....	3	1 term
*South Dakota State College of Agriculture and Mechanic Arts		
Roads and pavements.....	2	1 semester
University of South Dakota		
Roads and pavements.....	3	2 semesters
*Agricultural and Mechanical College of Texas		
Roads and pavements.....	3	1 term
Agricultural College of Utah		
Road construction.....	3	1 term
Road maintenance.....	3	1 term
University of Utah		
Highway construction.....	2	1 semester
Norwich University		
Highway engineering.....	2	1 semester
University of Vermont		
Highway engineering.....	2	1 semester
University of Virginia.		
Roads, streets, and street railways.....	3	1 semester
*Virginia Military Institute		
Roads and pavements.....	3	$\frac{1}{2}$ semester
*Virginia Polytechnic Institute		
Roads and road-building material.....	3	1 term
Washington State College		
Highway engineering.....	3	1 semester
Advanced highway engineering.....	3	1 semester

INSTITUTION	PERIODS	SEMESTERS OR TERMS
University of Washington		
Highways.....	2	1 semester
Highway location.....	2	1 semester
Highway construction.....	2	2 semesters
Highway metals.....	1	2 semesters
Highway economics.....	2	1 semester
West Virginia University		
Roads and pavements.....	1	1 semester
University of Wisconsin		
Roads and pavements.....	2	2 semesters
University of Wyoming		
Roads and tunnels.....	1	1 semester

HIGHWAY OFFICIALS

Office of Public Roads, United States Department of Agriculture.—Logan Waller Page, director; Paul D. Sargent, assistant director; Vernon M. Peirce, chief engineer; C. S. Reeve, chemist; Albert Goldbeck, testing engineer; W. C. Wyatt, chief clerk.

Alabama

State Highway Commission.—Robert E. Spragins, chairman; John Craft, V. B. Atkins, Dr. Eugene A. Smith, professor of geology, University of Alabama; G. N. Mitcham, professor of engineering, Alabama Polytechnic Institute; W. S. Keller, State highway engineer, Montgomery; R. P. Boyd, assistant State highway engineer.

County commissioners or boards of revenue elected by the people of each county in November of even years, have supervision over the roads. They divide the county into road precincts and appoint apportioners, who in turn appoint a road overseer for each precinct.

A county supervisor of roads to receive not more than \$5 per diem, may be appointed by county commissioners, and, in acts allowing bond issues, it is usual to provide that county commissioners may appoint an engineer and fix his salary.

Alaska

Road work is under supervision of board of road commissioners of Alaska, composed of officers of the corps of engineers, U. S. A., upon whose recommendations appropriations are made by Congress.

Lieutenant-Colonel W. P. Richardson, U. S. A., president of board; Lieutenant Glen E. Edgerton, C. E., U. S. A., engineer officer.

Arizona

Lamar Cobb, State engineer, Phoenix.

County superintendents of roads elected by the people, have charge of road work.

Arkansas

County judges have control of highways, but there are many special laws affecting localities.

California

State Highway Commission, Sacramento.—Burton A. Towne, Lodi; Charles D. Blaney, Saratoga; Newell D. Darlington, Los Angeles.

Austin B. Fletcher, recently of San Diego, formerly the secretary and chief executive officer of the Massachusetts highway commission, is the highway engineer. Wilson R. Ellis of Berkley is secretary of the commission.

County supervisors, of whom there are five in each county, elected for a term of four years in November of even years, have authority over roads. They appoint a county surveyor.

Colorado

State Highway Commission, Denver.—C. P. Allen, chairman; W. M. Wiley, Thos. H. Tully, J. E. Maloney, secretary and engineer, W. F. Higgins, chief clerk.

County commissioners of whom there are three in each county elected by the people in November of even years for two, four and six years respectively, have jurisdiction over local roads.

General road overseer for county may be appointed by county commissioners and deputy overseers for districts.

Board of directors is appointed in each Corporate Road District formed after petition of voters.

Connecticut

State Highway Commission, Hartford.—James H. MacDonald, Hartford, State highway commissioner; E. H. Kelsey, Deputy highway commissioner.

Division Engineers.—R. S. Hulbert, Winsted; W. H. Knight, Sharon; E. C. Welden, Scotland; James A. McElroy, Bridgeport; R. G. Pike, Jr., Middletown; C. A. Campbell, New London; F. Walden Wright, Putnam; George E. Smith, New Haven.

Selectmen of towns have jurisdiction over local roads.

Delaware

New Castle County Levy Court.—John W. Dayett, president, Cooch's Bridge; Henry W. Perkins, Wilmington; Samuel J. Dennison, Wilmington; Isaac C. Elliott, Wilmington; W. Frank Taylor, Hockessin; Daniel Thompson, Newark; James A. Buckson, Blackbird; James Wilson, county road engineer.

New Castle County State highway commissioner, Francis A. Price, who is a State official, and has charge only of the building of improved roads.

There are ten Hundreds (townships) in this county outside of the city of Wilmington in each of which there is a road supervisor who does work on the common roads under the direction of the county road engineer, by whom all bills must be approved before they are paid by the levy court. All money spent on the Hundred roads is raised in the Hundred in which it is spent, by a tax levy made by the levy court. The present rate is 40 cents on \$100.

Kent County Levy Court.—James T. Truax, Smyrna; Thomas V. Keith, Dover; Charles Sherwood, Cheswold; John W. Virdin, Kenton; Benjamin Donoho, Dover; William M. Hughes, Felton; George H. Gooden, Woodside; Nehemia Cain, Felton; David T. Booth, Harrington; John P. Carmean, Milford.

Kent County State highway commissioner, C. B. Hope, Dover. The levy court commissioners appoint "overseers" for the purpose of *working* the roads, as many as "15 or 20" are appointed for each district.

Sussex County.—County road engineer, William J. Mustard, Georgetown, who has supervision over the "general road fund" amounting to \$17,000 for the county and he appoints two supervisors for each of the ten representative districts. There is no Sussex County State highway commissioner.

The road law is practically the same as in New Castle except that the county is not authorized to issue bonds for building roads.

District of Columbia

Engineer commissioner in charge of all public work, Major William V. Judson, U. S. A.; surface division is in charge of Captain Mark Brooke, U. S. A., assistant to the engineer commissioner; engineer of highways, Mr. C. B. Hunt.

Florida

County commissioners of whom there are five in each county, elected in November of even years, for two year terms, have supervision of roads.

Three road commissioners must be appointed annually by the county commissioners for each road district.

A road overseer must be appointed by the road commissioners for each subdivision of road districts.

Where the voters elect to have their road district a special tax road district they elect at the same time three trustees to supervise the road work of the district.

Georgia

Georgia has no State highway department but the geological survey collects and publishes data on roads. Dr. S. W. McCallie is the State Geologist.

State prison commission has authority over convict labor, which is utilized for road improvement. Mr. R. E. Davidson, Atlanta, is the chairman of the commission.

Board of county commissioners three to five members, have jurisdiction of roads and must divide county into road districts. Three road commissioners are appointed for each road district and these appoint overseers.

Idaho

State engineer, A. E. Robinson, Boise.

State highway commission consists of the governor, the State mining inspector and the State engineer.

Boards of three county commissioners, elected for two year terms in January of odd years, have jurisdiction except in counties which have been organized in good road districts. In districts organized upon petition of residents three highway commissioners are elected in November for a term of four years, the next election to be in 1915. They appoint a director of highways who must be an experienced road builder.

Illinois

State Highway Commission, Springfield.—Dr. E. J. James, chairman; Joseph R. Fulkerson, Lafayette Funk, A. N. Johnson, Springfield, State highway engineer.

In counties having township organization three township highway commissioners elected by the people, have jurisdiction one of whom is elected in April of each year, and may employ general superintendent, overseers, et al. In counties not having township organization, county boards of commissioners, elected by the people, divide county into road districts, in each of which three highway commissioners and one clerk are elected, and these may appoint general superintendent, overseers, et al.

Indiana

Three county commissioners in each county, one commissioner elected in November of each year, have supervision over roads. They are also ex-officio a board of directors for all free gravel, macadam and turn pike roads and may appoint a superintendent for each ten to fifteen miles. They also appoint superintendents of construction for gravel roads built by assessment of contiguous property.

Boards of township trustees elected in November every four years divide the township into road districts and a supervisor is elected every odd year in December in each road district.

Iowa

The Iowa State College of Agriculture acts as a State highway commission.

Highway engineer, T. H. MacDonald, Ames.

County board of supervisors elected by people (three to seven members) control county work, bridge funds and portion of road funds.

Township trustees, three for each township, elected by people, control township road funds. They may appoint road superintendents.

Kansas

The State engineer is appointed by the State Agricultural College, Manhattan.

W. S. Gearhart, Manhattan, State engineer; A. R. Losh, Assistant State Engineer.

Board of three county commissioners elected in November of odd years, has jurisdiction over State and county roads.

County engineer appointed by commissioner in June of odd years, has general charge under direction of county commissioners.

Township trustee, clerk and treasurer constitute township highway board having charge of township roads and mail routes.

One or more overseers shall be appointed by township board for each mail route and township road.

Kentucky

State road commissioner, to be appointed by governor and to act in advisory capacity, authorized by legislature in March, 1912.

County fiscal court, consisting of county judge and five to eight justices of the peace, elected by people, have jurisdiction over all roads. County judges elected for four years, next election 1913.

A county road overseer is appointed by said court.

A district road overseer is appointed for each road district.

Louisiana

The board of State engineers of Louisiana, of which the highway department is a branch, is composed of the following members; F. M. Kerr, chief state engineer, Gervais Lombard, Walter H. Hoffman, J. W. Monget, H. C. Smith.

The officers of the highway department of the board of State engineers, are: F. M. Kerr, chief State engineer, and president of the board of state engineers; Gervais Lombard, acting State highway engineer; C. C. Sandoz, secretary.

Besides the above named officials, the principal employees of the State highway department, are: Geo. L. Cooley, superintendent of construction, New Orleans; C. M. Kerr, assistant engineer and chief draftsman.

Maine

P. L. Hardison, State commissioner of highways; L. D. Barrows, assistant commissioner of highways; S. Frank Pierce, clerk.

Board of three selectmen in each town elected in March each year has control of roads.

Maryland

State Roads Commission, Baltimore.—Governor is ex-officio chairman; John M. Tucker, S. M. Shoemaker, Francis C. Hutton, Ira Remsen, Wm. Bullock Clark, Walter W. Crosby, chief engineer; E. E. Goslin, secretary.

Boards of county commissioners have full authority over local roads and may appoint supervisors, engineers, etc.

Massachusetts

State Highway Commission, Boston.—William D. Sohier, Frank D. Kemp, (vacancy caused by resignation of Harold Parker, chairman, not filled) Frank L. Bieler, secretary; Arthur W. Dean, chief engineer.

County commissioner may, upon petition lay out new roads or make specific improvements, and may direct towns and cities to make such improvements.

Selectmen, three to each town, elected in March each year, have purchasing power, except in cities.

A road superintendent or highway surveyor is usually elected at each annual town meeting.

Michigan

Townsend A. Ely, State highway commissioner, Lansing; Frank F. Rogers, deputy highway commissioner.

In counties having township system, three township commissioners, elected annually, have control.

In counties having district system control vests in a board of district supervisors, one from each township in the district, elected for a term of two years.

In counties having county system the Board of three County Commissioners is in charge. One commissioner is elected every two years, to hold office six years. All elections held the first Monday in April.

Minnesota

State Highway Commission, St. Paul.—C. M. Babcock, chairman; F. S. Bell, Clarence I. McNair.

George W. Cooley, State engineer and secretary of commission; John H. Mullen, chief road deputy; Carl E. Nagle, chief bridge deputy; S. C. Notestan, chief clerk.

Board of five county commissioners elected in November for four year term has control. Next election 1915. Three town supervisors in each town conduct work under county commissioners.

Mississippi

Each county must be divided into five districts, each of which elects a supervisor, the five constituting a county board of supervisors, who have full authority over roads. They are elected for a term of four years and take office in January. The next change occurs in 1916. The board of supervisors appoint three road commissioners to manage the roads of the county for a term of four years, subject to supervisors control.

Missouri

Highway Department of State Board of Agriculture, Columbia.—Curtis Hill, State highway engineer; William C. Davidson, assistant State highway engineer.

Missouri has two systems of local road administration. In ninety-two counties the county court, consisting of a chairman, elected for a term of four years, and two associates, elected for two years has control, and appoints a county engineer and divides the county into districts and appoints overseers who report to county engineer.

In the twenty-two township counties the roads in each township are under the control of a township board of three members, elected every two years, who divide the township into road districts and appoint overseers who report to county engineer.

Next election for chairman county court November, 1914. Two associate members county court elected November of even years. County engineers appointed in January of even years.

Montana

A. W. Mahon, Helena, State engineer.

County commissioners, three to each county, have supervision of roads. One commissioner is elected in November of even years and holds office for six years. The commissioners appoint supervisors and a county surveyor.

Nebraska

Donald D. Price, State engineer, Lincoln; H. W. Roberts, assistant State engineer, Lincoln.

County commissioners three to each county, elected in November of even years, have control where township organization does not exist. They divide county into districts, in each of which an overseer is elected by the people.

The county commissioners appoint a county highway commissioner in January of each year, who must be experienced road builder.

In counties under township organization, the county commissioners divide the county into seven supervisor districts, in each of which a supervisor is elected by the people. The town boards in each town have supervision over the roads, subject to the general control of the board of supervisors or the county commissioners. The town board divides the town into road districts and appoints an overseer for each district.

Nevada

W. M. Kearney, State engineer, Carson City; Perry Davis, superintendent of construction.

County commissioners elected by the people have supervision over the roads. They appoint a county surveyor and divide the county into road districts, in each of which they appoint a road overseer.

New Hampshire

State Highway Department, Concord.—S. Percy Hooker, State superintendent of highways.

Assistant Engineers.—F. W. Brown, Concord; F. E. Everett, Elkins; W. A. Grover, Dover; E. O. Hathaway, Nashua; H. L. Smith, Lakeport; E. M. Brooks, Keene; O. M. James, Northwood Narrows; C. M. Chandler, Concord; C. P. Riford, Concord;

New Jersey

State Department of Public Roads, Trenton.—Edwin A. Stevens, State road commissioner; Robert A. Meeker, State road supervisor.

The State department of public roads consists of the governor, the speaker of the house of representatives, the president of the senate and a commissioner of public roads, appointed by the governor. The State road supervisor is appointed by the commissioner and is in effect a chief engineer.

County boards of chosen freeholders, one member from each township, elected in January each year, have charge of roads. They appoint a county engineer in January for three year term. They also at the same time and for the same term appoint a county supervisor for construction work.

New Mexico

State Good Roads Commission, Santa Fe.—Charles D. Miller, State engineer; John D. Meriwether, Las Vegas; John W. Lewis, Carlsbad; W. R. Smythe, Santa Fe, engineers.

Commission consists of the governor, the commissioner of public lands and the State engineer.

County commissioners elected by the people have charge of road work. They appoint three supervisors.

New York

State Commission of Highways, Albany.—C. Gordon Reel, superintendent of highways; John A. Benschel, State engineer and surveyor; Duncan W. Peck, superintendent of public works.

Charles P. Dillon, secretary of highway commission; Howard F. Carpenter, assistant secretary of highway commission; Charles F. Foley, first deputy superintendent; Edwin E. Dorn, second deputy superintendent; Harry P. Willis, chief engineer; Spencer J. Stewart, Poughkeepsie; Paul McLoud, Albany; James H. Studevant, Watertown; Frederick S. Strong, Syracuse; James S. Morrissey, Rochester; Perry Filkin, Binghamton, division engineers. The resident engineers are: John R. Kaley, Poughkeepsie; R. J. Marcher, Syracuse; Howard Smith, Syracuse; George T. Smith, Rochester; J. E. Kelly, Rochester.

Town highways are under town superintendents elected in November of even years. The superintendents are under supervision of a county superintendent.

North Carolina

Geological and Economic Survey, Chapel Hill.—Dr. Joseph Hyde Pratt, State geologist and engineer; W. S. Fallis, highway engineer.

County commissioners, three in each county, elected in November of even years, have control of roads. Most of the counties, however, have special road laws, some of them placing control in hands of township road commissioners.

North Dakota

T. R. Atkinson, State engineer, Bismark; Jay W. Bliss, assistant State engineer, Bismark.

County commissioners, of whom there are three in each county, elected by the people, appoint a county superintendent of highways in January of even years. The county superintendent has charge of the construction and maintenance of roads, and appoints deputies.

County Superintendents.—Griggs County, Martin A. Ueland, Cooperstown; Dickey County, Sol Hunter, Oakes; Stark County, W. R. Veigel, Dickinson; Billings County, Thor G. Plomasen, Beach; Burleigh County, John Ecklund, Wilton.

Ohio

State Highway Department, Columbus.—James R. Marker, State highway commissioner; deputies: Clifford Shoemaker, construction; Clyde T. Morris, bridges; A. H. Hinkle, maintenance. Division engineers: D. W. Seitz, Harwood Lersch, J. R. Burkey, John R. Moore, Jr., Nicholas Koehler, J. H. Tilton, chief clerk.

County commissioners three to each county, elected in November of even years, have charge of county roads. County surveyor, elected at the same time, has direction of actual work.

Township trustees, three to a township, elected in November of odd years, have charge of township work.

Oklahoma

State Department of Highways, Oklahoma City.—Sidney Suggs, commissioner; Clark Hudson, assistant commissioner; W. R. Goit, chief engineer; Walter S. Gilbert, secretary.

Township board of trustees elected by the people has charge of roads in most of the counties. They appoint a road supervisor for each road district into which the township is divided.

County commissioners elected by the people may appoint a county engineer.

Several townships may be incorporated as a road improvement district for voting bonds and making improvements.

Oregon

John H. Lewis, State engineer, Salem; Percy A. Cupper, assistant State engineer.

County judges elected by the people have charge of roads.

Township supervisors elected every January have charge of work under direction of county judge.

Pennsylvania

State Highway Department, Harrisburg.—E. M. Bigelow, State highway commissioner; J. W. Hunter, first deputy commissioner; E. A. Jones, second deputy commissioner; S. D. Foster, chief engineer; L. F. Neffe, chief clerk.

Assistant Engineers: George H. Biles, Harrisburg; C. W. Hardt, Harrisburg; John T. Gephart, Harrisburg; D. G. Anderson, Philadelphia; E. D. Garrett, Philadelphia; L. L. Robbins, Pittsburgh; A. W. Burk, Pittsburgh; A. S. Clay, Bloomsburg; H. W. Claybaugh, Franklin; W. F. Cressman, Allentown; E. S. Frey, York; S. W. Jackson, Wellsboro; W. A. Wynn, Warren; O. K. Taylor, Jr., Washington; C. S. Lemon, Hollidaysburg; A. W. Long, Scranton.

County commissioners, three to each county, elected for three year terms have charge of county work. Township supervisors, three to each township, have charge of township work. One member is elected in February each year.

Rhode Island

The State board of public roads at providence is made up as follows: John H. Edwards, Robert B. Treat, Frederick E. Perkins, William C. Peckham and John F. Richmond, members of board; John Bristow, engineer; Peter J. Lamson, clerk.

The governor appoints one member of the board from each county for a term of five years, one vacancy occurring every year.

Each town through its officials, known as road commissioners or surveyors, looks after its road affairs. These officials are in some cases elected, in others appointed, by town council.

South Carolina

County commissioners elected in November of even years have charge of roads. In most of the counties a county supervisor of roads is elected at the same time. In other counties the commissioners appoint a county engineer.

E. J. Watson, commissioner of agriculture, commerce and industries, Columbia.

South Dakota

Samuel H. Lea, State engineer, Pierre; S. R. Green, assistant.

In some of the counties the roads are under supervision of county commissioners, of whom there are five, elected by the people. In other counties township boards of three supervisors have charge of roads within the township.

Tennessee

State Geological Survey, Dr. G. H. Ashley, State geologist, Nashville.

State commission of public roads of three members to be appointed by the governor.

Judges of county courts have supervision of roads. In January of odd years the county court divides the county into road districts and appoints a road commissioner for each district. A board of turnpike commissioners, selected every four years by county court and consisting of three members, looks after toll roads. The district road commissioner appoints an overseer for each section of road in January each year. Many counties have special laws.

County judges have control of roads, and preside over commissioners. Court of four members besides the judge. The members are elected in November of even years for three-year terms. Districts or precincts may be formed in counties in which case trustees elected at same election have charge.

Utah

State highway commission consists of the governor, the State engineer, the State treasurer, and one member of the faculty of the Agricultural College and of the University of Utah.

Personnel.—William Spry, chairman; David Mason, R. R. Lyman, J. W. Jensen, Caleb Tanner, secretary and State engineer, Salt Lake City.

County commissioners, of whom there are three in each county, elected in November of even years, have supervision of roads. They appoint a county road commissioner who has full charge of the road work.

Box Elder County: P. N. Pierce, engineer in charge, Brigham City.
Cache County: George O. Toolson, engineer in charge, Smithfield; William Murray, engineer in charge, Wellsville.
Carbon County: R. J. Turner, engineer in charge, Price.
Davis County: T. Bennett, engineer in charge, Farmington.
Emery County: Heber Frandsen, engineer in charge, Castle Dale.
Garfield County: Jos. McCullough, engineer in charge, Panguitch.
Grand County: J. P. Miller, engineer in charge, Moab.
Iron County: H. M. Hendrickson, engineer in charge, Parowan.
Juab County: A. J. Stalnaker, engineer in charge, Nephi.
Kane County: J. G. Spencer, engineer in charge, Kanab.
Millard County: J. R. Bennett, engineer in charge, Deseret.
Morgan County: Lyman Mechem, Senior, engineer in charge, Morgan.
Piute County: Joseph Jensen, engineer in charge, Marysvale.
Rich County: George Kennedy, engineer in charge, Randolph; D. S. Cook, engineer in charge, Garden City.
Salt Lake County: Willard Snow, engineer in charge, Salt Lake City.
San Juan County: Wayne H. Redd, engineer in charge, Grayson.

San Pete County: Martin Isaacson, engineer in charge, Ephriam.
Sevier County: Hans Tuft, engineer in charge, Monroe.
Summitt County: William R. Smith, engineer in charge, Park City.
Tooele County: A. A. Russell, engineer in charge, Tooele.
Uinta County: Sylvanus Collett, Engineer in charge, Vernal.
Utah County: George Y. Myers, engineer in charge, American Fork.
Wasatch County: J. W. Moffitt, engineer in charge, Boneta.
Washington County: I. A. MacFarlane, engineer in charge, St. George.
Wayne County: George A. Chappell, engineer in charge, Loa.
Weber County: Joseph S. Storey, engineer in charge, Ogden.

Vermont

State highway commissioner, Charles W. Gates, Franklin.

The State highway commissioner appoints a supervisor of roads in each county as his representative.

In March each year three selectmen and a road commissioner are elected in each town, the former to have charge of purchases and location and changes in roads, and the latter to have charge of maintenance.

Virginia

State Highway Commission, Richmond.—P. St. J. Wilson, State highway commissioner; William M. Thornton, dean, engineering department, University of Virginia; Colonel T. A. Jones, professor of civil engineering, Virginia Military Institute; Colonel R. A. Marr, dean engineering department, Virginia Polytechnic Institute; G. P. Coleman, assistant commissioner.

Engineers: H. M. Darden, assistant; D. McDonald, assistant; C. B. Scott, assistant; O. L. Grover, bridge; C. D. Snead, assistant to bridge.

County boards of supervisors, consisting of three members elected in January to serve four years have control of roads. The next election will be held in 1916. The board may appoint a county road superintendent in January of even years. They may also appoint a superintendent for each magisterial district. There are many special road laws relating to specific counties.

Washington

State Highway Board, Olympia.—John G. Lewis, State treasurer, chairman; W. J. Roberts, State highway commissioner, Secretary; Governor M. E. Hay, State Auditor C. W. Clausen, and George A. Lee of the public service commission.

Three county commissioners, elected in November of even years, two every two years and one every four years, the long term alternating, have control of roads, except where township system prevails. They divide county into districts and appoint a supervisor for each to serve at their discretion.

A county engineer is elected in November of even years.

The citizens of any county may by majority vote adopt township organization.

West Virginia

Three county commissioners, elected for six years, one every two years in November of odd years, have control of roads. The county commissioners may appoint a county engineer in September of odd years.

Wisconsin

Wisconsin Highway Commission, Madison.—J. A. Hazelwood, chairman, Jefferson; W. O. Hotchkiss, secretary, Madison (ex-officio); F. E. Turneaure, Madison (ex-officio); John S. Owen, Eau Claire; J. H. Van Doren, Birnamwood.

A. R. Hirst, acting State highway engineer; M. W. Torkelson, bridge engineer.

Three county commissioners elected in April for three years have charge of county road work. Where State aid is obtained they must appoint a county highway commissioner to act under the State highway commission.

A town chairman of town board, elected in April each year, has charge of town roads.

Wyoming

A. J. Parshall, Cheyenne, State engineer; Henry G. Watson, deputy engineer.

Three county commissioners, elected in November of even years, one for two years, one for four years and one for two years respectively, have charge of roads. They divide the county into road districts, in each of which a supervisor is elected.

State Geologists

Alabama Geological Survey, Dr. Eugene A. Smith, State geologist, University, Alabama.

Arkansas Geological Survey, A. H. Purdue, State geologist, Fayetteville, Arkansas.

California State Mining Bureau, W. H. Storms, State mineralogist, San Francisco, California.

Colorado Geological Survey, R. D. George, Boulder, Colorado.

Connecticut Geological and Natural History Survey, Prof. W. N. Rice, Superintendent, Middleton, Connecticut.

Florida Geological Survey, E. H. Sellards, State geologist, Tallahassee, Florida.

Geological Survey of Georgia, Dr. S. W. McCallie, State geologist, Atlanta, Georgia.

Illinois State Geological Survey, F. W. De Wolf, director, Urbana, Illinois.

Indiana Department of Geology and Natural History, Edward Barrett, State geologist, Indianapolis, Indiana.

- Iowa Geological Survey, Prof. Geo. F. Kay, State geologist, Iowa City, Iowa.
- Kansas State Geological Survey, Prof. Erasmus Haworth, State geologist, University of Kansas, Lawrence, Kansas.
- Kentucky Geological Survey, Prof. C. J. Norwood, director, Lexington, Kentucky.
- Maine State Survey Commission, Cyrus C. Babb, State engineer, Brunswick, Maine.
- Maryland Geological Survey, Dr. Wm. B. Clark, State geologist, Johns Hopkins University, Baltimore, Maryland.
- Michigan Geological Survey, Mr. R. C. Allen, State geologist, 503 Hollister Block, Lansing, Michigan.
- Minnesota Geological and Natural History Survey, W. H. Emmons, director, Minneapolis, Minnesota.
- Mississippi Geological Survey, E. N. Lowe, State geologist, Jackson, Mississippi.
- Missouri Bureau of Geology and Mines, Dr. H. A. Buehler, director, Rolla, Missouri.
- Nebraska Geological Survey, E. H. Barbour, State geologist, University of Nebraska, Lincoln, Nebraska.
- New Jersey Geological Survey, Dr. H. B. Kummel, State geologist, Trenton, New Jersey.
- New York State Education Department, Science Division, Dr. John M. Clarke, director and State geologist, State Museum, Albany.
- North Carolina Geological and Economic Survey, Dr. Joseph Hyde Pratt, State geologist, Chapel Hill, North Carolina.
- North Dakota Geological Survey, A. G. Leonard, State geologist, Grand Forks, North Dakota.
- Ohio Geological Survey, J. A. Bownokner, State geologist, Columbus, Ohio.
- Oklahoma Geological Survey, D. W. Ohern, Norman, Oklahoma.
- Pennsylvania Geological Survey, R. R. Hice, State geologist, Beaver, Pennsylvania.
- Rhode Island National Reserve Survey, C. W. Brown, State geologist, Providence, Rhode Island.
- South Carolina Geological Survey, Columbia (*Abolished*).
- South Dakota Department of Geology, University of South Dakota, E. C. Perisho, State geologist, Vermilion, South Dakota.
- Tennessee Geological Survey, G. H. Ashley, State Geologist, Capitol Annex, Nashville, Tennessee.
- Vermont Geological Survey, Geo. H. Perkins, State geologist, Burlington, Vermont.
- Virginia Geological Survey, Dr. Thos. L. Watson, State geologist, Charlottesville, Virginia.
- Washington Geological Survey, Prof. Henry Landes, State geologist, Seattle, Washington.
- West Virginia Geological Survey, Dr. I. C. White, State geologist, Morgan town, West Virginia.
- Wisconsin State Geological and Natural History Survey, E. A. Birge, director, Madison, Wisconsin.
- Wyoming Geological Survey, C. E. Jamison, State geologist, Cheyenne, Wyoming.

CONVICT LABOR

The information contained in this chapter is given exactly as reported by officials in the several States. No effort has been made to institute comparisons or draw conclusions or to tabulate the data obtained, as it is considered to be of more practical value as a statement of facts than if presented as a treatise. Most of the reports were in reply to the following inquiries sent from this office:

1. Are convicts actually used for road purposes, and if so how?
2. Approximately how many convicts were so utilized during 1911, or what was the average number at work during the working season?
3. The average cost per man for guarding, feeding, supervision, medical attention, etc.
4. The effectiveness of the convict as compared with paid labor.
5. The effect of such work upon the health and character of the convict.
6. Approximately the amount of work accomplished by the convicts in 1911. That is, mileage of roads, amount of materials prepared, bridges constructed, etc.

Alabama

APRIL 9, 1912.

I think that you may take our record of the road work in Union Springs, Bullock County, as a fair average of the cost of working convicts, and I am enclosing statement herewith.

W. S. KELLER,
State Highway Engineer.

Bullock County

Bullock County.—Road improved known as Sardis Road. Started at the city limits of Union Springs. Character of road, sand-clay. Width of road bed, 22 feet. Width of sand-clay, 14 feet. Length of road graded, 3 miles. Length of road sand-clayed, 2.7 miles.

Distribution of Cost

Earth excavation 14420.1 yards.....	\$1608.73
Sand-clay 6125 yards.....	1477.20
Clearing and grubbing.....	200.00
Vitrified pipe, culverts and head walls.....	418.43
Three wooden bridges.....	152.41
Total amount spent.....	\$3856.77
Amount not spent on March 1.....	143.23
	\$4000.00

The amount left is enough to finish the sand-clay to the 3-mile point. Cost per mile, \$1333.33.

The work was done with the county outfit and convicts. The total upkeep of the outfit and convicts, the salary of the foreman and guards, was paid out of the joint State and county fund of \$4000.

The cost of the teams and convicts varied each month according to the weather, depending on the number of days they could actually work. The average cost of the teams was \$1.65 per day. The average cost of convicts was 55 cents per day each.

Bullock County has made an excellent showing with the money spent, considering the bad weather. Grading was very heavy, the grades on the old road being 10 per cent and 14 per cent. These were reduced to a maximum grade of 5 per cent by relocating and grading. The work has been well done and is up to specifications, true to cross section and is a credit to Bullock County and the State.

California

MARCH 14, 1912.

The law seems to provide that the convicts in the State prisons may be employed in manufacturing broken stone and, in the Folsom prison, I am told, that there is a small crushing plant which has been used to some extent. It is, however, not so active an industry as to interfere with the privately owned crushing plants.

A. B. FLETCHER,
Highway Engineer

Colorado

APRIL 8, 1912.

1. *Whether or not convicts are actually worked on the roads, and if so, how?*—Our convicts have been worked on the public roads in Colorado since 1908 when the first experimental camp was put out, although the State law providing for this class of work was enacted in 1905. I am enclosing you herein a copy of the law which provides for the work. Briefly, the system is this: When a county in this State desires to use a gang of convicts, they make formal applica-

tion to the warden of the penitentiary, and he uses his own discretion as to the advisability of detailing such camp. The county pays all the necessary expenses of feeding the men, salaries of overseers, camp and road equipment and tentage, powder, feed for teams, etc., while the State provides clothing and shoes for the men. The men are at all times under the sole charge and direction of the warden of the penitentiary who exercises a personal supervision of all the work and who details two competent overseers for the nominal superintendence of the work. The counties have no jurisdiction whatever over the overseers of the camps or the men, the discipline, etc., being conducted from the prison by correspondence and by personal visits from time to time by the warden. When the work was first undertaken the usual importance was attached to the guarding of the men with the result that the work lagged and the men worked as men will with the constant fear of punishment and armed guards over them. When the writer assumed charge of the penitentiary in 1909, he was impressed with the idea that these men would perform a better measure of work if certain privileges were accorded them and if an appeal was made to the *best* in them, and with this end in view an *honor system* was soon established with the result that the quality and quantity of the work doubled and trebled in very short order. Instead of the obsolete and traditionally stupid idea of armed guards and all the usual prison restraints, the camps were placed in charge of *unarmed* and competent overseers; stripes were abolished and the men clothed in neat blue and khaki clothing; the quality of the food was bettered with the results that during the past three years our prisoners have earned over \$300,000 to the taxpayers on their road work. During the biennial period ending November 30, 1910, we had built over 50 miles of splendid road for \$56,700 the cost of which contractors estimated would have been at least \$212,000, and the work done during 1911 will be spoken of in another portion of this letter.

2. *Approximately how many convicts were so utilized during 1911 or what was the average number at work during the working season?—*During 1911 we have had and still have four large camps in operation, approximately each about *fifty men*. In all, during 1911, I have had some six hundred individual men out on the camps. This is occasioned by the fact that a great many of our men are paroled from the camps instead of the prison proper and constant fresh detachments are sent to the camps from time to time to fill them up to the average standard. The work progresses all year round, the climatic conditions of Colorado being favorable to that end and the average during the year has been fifty men at each camp or an average of two hundred men working daily.

3. *The average cost per man for guarding, feeding, supervision, medical attention, etc.—*The average cost per day per man for feed-

ing was during the year 1911 but *30 cents*, and the cost of the entire maintenance of the camps including salaries of overseers, camp equipment, wear and tear, feed for teams, feed for men, etc., averaged about *50 cents* per day per man, and for this sum each man performs a good \$2 day's work.

4. *The effectiveness of the convict as compared with paid labor.*—Personally, I believe that our men have worked far more faithfully, harder and with more zeal and enthusiasm than the paid laborer would. Not that the paid laborer is to be disparaged, but the convict employed on this class of work has the following special incentives: outdoor life, sunshine, better clothing, better food and more privileges as against the walls and rigid discipline of the prison, and an additional allowance of ten days per month from his sentence, and these incentives spur the men on to work with the degree of zeal, energy and loyalty that cannot be attained by the regular grading or mining camp.

5. *The effect of such work upon the health and character of the convict.*—I cannot speak too highly on this. The discipline at these camps has been as nearly perfect as it is possible to be and the effect upon the prisoners has given them superb health and has improved their physical condition to a maximum; their morals have improved wonderfully, for when a man keeps his *word of honor*—when he splendidly maintains his pledges, with nothing but a moral incentive—he has taken a great stride toward genuine reformation and betterment. Some of these camps are 50, 100 and 200 and even 300 miles from the prison. The camps are model and sanitary and there is nothing to prevent a man's escape, should he be so inclined, yet withal, out of over a thousand individual men in the past three years the percentage of successful escape from our camps is *less than 1 per cent*. This alone should attest the effect upon the character of the men. When one considers that these men perform their work willingly and cheerfully and with a zeal and energy that is seldom equaled, avoiding contact with the busy world about them and scrupulously adhering to their work, withstanding the many temptations of intercourse with the world about them, it must be conceded that the morals, discipline, etc., of the men in the camps have reached a standard that is eminently satisfactory from every standpoint.

6. *Approximately the amount of work accomplished by the convicts in 1911.*—With an average of two hundred men in four camps of fifty men each, we have built over *100 miles* of good roads during 1911, and before the close of the present year it is our ambition to complete three hundred more, making a total of *400 miles* for the biennial period of two years and which will represent a saving to the State of over \$500,000.

THOS. J. TYNAN,
Warden, State Penitentiary

Georgia

APRIL 6, 1912.

We have something like five thousand convicts now in use on our roads, which have been constantly used for that purpose only for the last three years, as the legislature of 1908 abolished the old lease system.

R. E. DAVIDSON,
Chairman the Prison Commission of Georgia.

Illinois

MARCH 1, 1912.

1. Convicts in the two penitentiaries of Illinois are employed in the production of road material, as provided in section 12 of the convict labor law.

2. In the stone industries of the two penitentiaries the daily average of convicts employed in the production of macadam or road material, for the year 1911 was 687.

3. The average cost per man for maintenance (annually) and prison charges of every kind is \$176.

4. It requires the labor of three convicts to equal the production per day of one paid laborer.

5. The effect of such work upon the health of the convicts is good, but possibly not elevating in character.

6. The stone industries of the two penitentiaries produced and delivered to the State highway commission during the year 1911, 152,430 cubic yards of macadam.

A. N. JOHNSON,
State Highway Engineer.

Louisiana

APRIL 8, 1912.

1. The State convicts are worked upon the roads during the entire year, the number worked varying with the number of camps in operation. The number used on road work during the entire year of 1911 will average one hundred per month, there being an average of about two thousand State convicts all told, most of whom are working on State farms and public levees.

2. Forty cents per day.

3. Results show that the cost of road work constructed with convict labor amounts to only about one-half as compared with work let by contract for the same class of work, namely; Standard sand-clay or earth roads. They are the finest class of labor in the world, all being robust negroes, who, when regulated as the State convicts are, made to retire early, to keep themselves clean, and to observe the necessary hygienic regulations, wholesome and substantial food, properly prepared and served at regular hours being provided, thereby furnishing ideal conditions.

4. Road work being "open air work" it is but natural that the convicts so worked enjoy better health, and are more amiable in disposition, than those confined, where pure air and healthful sunshine are denied them.

5. The enclosed statement shows the work accomplished by convict labor in this State with full details. Figures shown, include the cost of material used in construction of same.

I am of the opinion that every State, which has in its State prisons, able bodied men, will do well to place practically all of them on the public roads, thus furnishing excellent opportunity to local communities to secure one of the cheapest, most reliable and effective forms of labor.

The only reason why Louisiana has not utilized more of the State convicts, is that the State owns and has in operation three large farms, and is expected to earn sufficient revenues from these farms, and from the profits on the contract work done on public levees to maintain themselves and provide for the retirement of the indebtedness incurred in purchasing and improving the State farms.

GERVAIS LOMBARD,

Acting State Highway Engineer.

Statement showing mileage of good roads constructed with convict labor, cost of same and cost per mile, from April 20, 1910 to April 20, 1912.

PARISH	GENERAL CHARACTER	MILEAGE	COST	AVERAGE COST PER MILE
Natchitoches*...	Earth	37.23	\$29,021.01	\$779.51
DeSoto†.....	Sand-clay	50.39	43,797.59	869.17
Ouachita‡.....	4½ miles gravelled, 13 miles earth	17.25	25,089.10	1,454.44
Rapides.....	Earth	3.57	3,273.50	916.94
East Baton Rouge§.....	Earth	22.22	23,400.53	1,053.13
Orleans.....	Earth	15.50	16,110.11	1,039.36
City of Baton Rouge.....	Wide gravelled	0.82	5,023.08	6,125.71
St. John the Baptist.....	Earth	0.50	450.00	900.00
Total.....		147.48	\$146,164.92	

*Three miles sand clay.

†Five miles natural gravel.

‡Average cost 4½ miles gravelled road, \$3,196.58.

Average cost 13 miles earth road, \$884.90.

§This item includes the cost of 1.1 miles of drainage canal costing approximately \$3,092.70.

TYPE OF ROAD	MILES	COST	AVERAGE COST PER MILE
Total earth roads constructed.....	92.02	\$83,758.79	\$910.22
Total sand-clay roads constructed.	50.39	43,797.59	869.17
Total gravelled roads constructed	5.07	18,608.54	3,770.32
	147.48	\$146,164.92	

Average cost per mile of all roads constructed.....\$991.03

C. C. SANDOZ,
Secretary, State Board of Engineers.

Michigan

FEBRUARY 29, 1912.

The Michigan law allows the use of State convicts on the highways when proper application is made to the wardens of the various penitentiaries and the request approved by the board of control. The law also allows the use of county prisoners, confined for petty offenses, upon county highways. The law relative to the use of State prisoners was enacted by the legislature of 1911 and up to the present time no county or other organization has made a request for State prisoners. During the coming summer, it is probable that several counties will work their county prisoners. Michigan has never been in accord with the working of State prisoners upon public highways largely for sentimental reasons, and it was only after a long fight that present concessions were granted.

Kalamazoo County.—During the 1909 October session of the board of supervisors of Kalamazoo County, the chairman of the county road commission, W. M. Bryant, requested that the supervisors give the commissioners the right to use the county prisoners on the roads in the various townships of the county.

The chairman made the assertion that if the petition was granted it would have a great effect on petty crime and that it would eliminate the tramp nuisance. In view of the fact that the sheriff reported 3546 tramps and vagrants the previous year, this seemed like a strong prediction.

The supervisors unanimously granted the petition. Preparations were immediately made to begin working the prisoners. Loomis Nash was sworn in as deputy sheriff, and has had charge of the prisoners.

Work was begun first on roads near the city with a squad of fifteen to eighteen men. Brush, stumps, stone and all obstructions were removed. After these roads were finished they were taken to Pavilion township, nearly ten miles from the city. Here 2 miles of brush along the highway was cut and burned and consider-

able ditching done. A house was rented, stove, cots, bedding and other necessary articles installed.

The prisoners were boarded at a nearby farmhouse. At the beginning the commissioners expected to put two crews at work of fifteen to twenty men in each, but decided to wait a few weeks and see what the results would be with one crew. The results were almost instantaneous. The news soon spread that Kalamazoo, known as one of the best feeding grounds between the two oceans, was a poor place to stop in the future.

After two months the attendance at the jail had run so low that the road gang was called in and preparation made for making tile. Four men are needed at this work to keep it running smoothly. Part of the time but two prisoners were available for this work and Superintendent Nash had to act as third and fourth man. Three 4-ton cement rollers were made, also a 28-foot bunkhouse with bunks on each side enough to house eighteen men. This is warmed by a stove and well lighted.

The outlook early last spring was not very promising for much help from county prisoners. The jail was practically empty. The fact that Kalamazoo County is a wet county surrounded by dry counties, helped to swell the number of prisoners. A good many men with thirsty appetite have drifted into Kalamazoo, got hilarious and received from ten to sixty days' sentence.

The majority are what we call one-term men. After their sentence expires they return home or drift to some other city where it is easier picking.

Only one camp had been maintained with prisoners. Nearly all of the time extra men were hired at this camp as the number of prisoners was too small to supply the dozen shovelers needed. Preference is always given to discharged prisoners who have been good workers. As a rule a hard drinker is a hard worker; in fact, the best help obtainable for such work. Two of the daily papers have generously contributed their papers to this camp.

An appeal through the papers has brought in a large number of the best magazines. A comparison of the sheriff's book showed that for the month of November, December, January, February and March, the first five months that this system was given a trial, there was a decrease in the number of vagrants of over 2300. The jail committee's last report showed for the six months ten vagrants during that period. The police report for the month of November, 1910, shows one arrest for vagrancy.

This has usually been one of the heaviest months of the year for "gentlemen of the road."

Very little in the way of extra precaution has been found necessary. A few, during the early spring months, walked away, but an extra thirty days' sentence by the circuit judge, quieted any inclination along the line.

These men are given good food and good treatment and respond readily to any call the superintendent may make.

After serving their sentence they come out clear-eyed, with hardened muscles and good appetites, ready to do a man's work. This system is like a two-edged sword—works both ways: a clean, moral and physical uplift for the men, and is making use of what had been waste material, a valuable by-product.

We found that the majority of prisoners came out penniless. After some discussion the chairman proposed to the commissioners to pay them for one day's work for each week if the superintendent gave them a clear bill of good behavior. This was passed and now a sixty-day man gets \$12.50 at the expiration of his sentence. This gives them a start and has had a vary gratifying effect.

This plan has been in operation for nearly three years and has proved to be very successful. We have had two cases where the prisoners have refused to work. At the 1911 October session of the Board of supervisors the sheriff was directed in the future to place such cases in solitary confinement until they were willing to go to work.

The prisoners in the majority of cases prefer to do road work rather than stay in jail, while many of the men when their sentence has expired find work or leave the county. We have found employment for many on farms or in factories. We employ no guards. The men are put on their honor. The superintendent is a deputy sheriff. This system has worked well and meets the approval of all our people.

Many delegations have visited Kalamazoo and looked into the merits of the plan and recommended it to their counties for adoption. This is being done in various counties.—W. M. BRYANT.

TOWNSEND A. ELY,
State Highway Commissioner.

Minnesota

MARCH 4, 1912.

Fifteen convicts at the St. Cloud Reformatory were engaged during the year 1911 for crushing stone for road purposes, which material was loaded on cars for free delivery to counties applying. They crushed during that time about 6500 cubic yards of granite and loaded same. Average output 35 cubic yards per day. Effectiveness compared with free paid labor, 100 per cent. Effect on health and character of convict, excellent. State allows prison authorities \$2500 per year for extra guards. All work done inside of prison grounds. No outside work done.

GEO. W. COOLEY,
State Engineer.

Missouri

MARCH 1, 1912.

There is no law in Missouri to permit the use of State convicts upon the roads, but we have a law permitting any county to work the county prisoners upon the public roads. Only a few of the counties have taken advantage of it, to any material gain.

Pettis County has used few convicts during the past year or two for concrete culvert work, but not to any extent. Buchanan County has used them for general earth work, ditching, cleaning up the road, etc. It cost this county about 10 cents per hour per man and while the work was good for the prisoners it is very doubtful if the county got value received.

Greene County has rather a novel idea, and a successful one, for working the county convicts on the roads of that county. The county, under the supervision of the county highway engineer, owns a portable outfit for quarrying and crushing. The plant consists of a crusher and bin, a twenty horse power traction engine, convicts' cage, cooking tent and guard outfit. The force consists of two guards, an engineer, twelve or fourteen prisoners, and a team.

The prisoners are accommodated with an open lattice work steel cage, mounted on trucks and wheels. The cage has a canvas top which can be lowered down the sides to enclose the whole vehicle. The bunks are arranged along the sides of the interior and can be lowered and raised on the order of berths in a pullman coach. The prisoners are locked up in this cage in bad weather and at nights. With the crusher, bin, cook, and guard outfits each on separate trucks the traction engine not only supplies power for operating but hauls the whole as a train over the roads to the quarry or desired location. The road district is required to prepare the road-bed for receiving the rock and also must put the rock on after it is crushed for them, the convict crew being in the nature of county aid by quarrying and crushing the rock. This outfit builds about 8 miles of rock road per year at a cost to the county alone of \$625 per mile. The men are fed for 40 cents per man per day. The output has averaged about 80 cubic yards of crushed rock per ten-hour day. The efficiency of this labor is about 60 per cent of that of able bodied free labor. The operating cost is:

	Per 10 hour day
Coal.....	\$1.50
Oil.....	.25
One engineer.....	2.25
One team and two guards.....	5.00
Food for fifteen men at 40 cents.....	6.00
Total.....	\$15.00

Jackson County has worked the county jail men upon the roads for years. They have been used at different times in chain gangs for ditching, grading, breaking rock by hand, quarrying, crushing and placing the stone. The convict road crew of this county during the year 1909 quarried and rocked $3\frac{1}{6}$ miles of a 16-foot road at a cost to the county of \$14,128 or \$4,528 per mile. This is approximately the cost of rocking the roads of that county by contract.

It is not the best method to scatter the convicts out along the roads for this requires either ball and chain or else a high cost of guarding. Prisoners convicted for short terms can be worked successfully in concentrated camps for quarrying and crushing and where the cost of operation, guarding, etc. is reduced to a minimum and shackles are not necessary. It costs about the same to maintain the prisoners in concentrated camps at work on the roads as to keep them in idleness in the jail cells. The average cost in twelve states for maintaining road convict forces is 45 cents per capita per day. Their efficiency is less than free labor but it is only 45 cents per day, 30 per cent of the cost of free labor, for 50 per cent efficiency of free labor.

Road rock of average quality is accessible in almost every county of Missouri and over about one-half the area of the State, it can be found within reasonable hauling distance of any road. The State could own portable outfits for quarrying and crushing an average output of about 100 cubic yards per day to be manned by State convicts. A steel cage with bunks along the sides, which could be lowered and raised on the order of berths in a pullman coach, to accommodate sixteen or eighteen men, and mounted on wheels, could be provided for the prisoners. With crusher, cook and guard outfits on separate trucks, the whole could be hauled to the railroad, shipped to the next place where wanted, and again hauled out to the road or quarry. This quarrying and crushing should be in some form of State aid, the county or road district having done the grading necessary to prepare the roadbed for receiving the rock and also having made arrangements to put on the rock after it is crushed for them.

CURTIS HILL,
State Highway Engineer.

North Carolina

Dr. Joseph Hyde Pratt, State geologist, Chapel Hill, reports that forty-one counties are working convicts on the public roads, but that details as to cost, effectiveness, etc., have not yet been fully compiled.

New Mexico

MARCH 8, 1912.

1. Convicts are actually used on roads with pick and shovel, etc. The law not only authorizes their use, but we have used them in compliance with the law.

2. We have had about an average of four camps in operation during the past three years, each camp consisting of about thirty men. The foreman and engineers look after two or three camps of convicts and as many paid labor camps as we work up in different sections. You understand, of course, all of our work is not done by convicts. We hire men in different portions of the State and construct roads by force account, principally in a coöperation with counties who advance certain portions of the money, the State contributing some and taking charge of the supervision.

3. The average cost per man, guarding, feeding, supervision, medical attention, etc., has recently been compiled by the writer. This information is not yet available for publication.

4. The convict labor is not as effective as paid labor, however, the deficiency is not as perceptible in mountainous work where drilling and solid rock work is encountered. The convicts are better adapted to this work than the slip work, grading, etc.

5. The effect upon convict health and character is good. We are getting along without guards now, and with the strict understanding that when a man is returned to the penitentiary he stays there.

6. The work accomplished by the convicts has been so piecemeal, and scattered throughout different portions of the State, that we could not give at this time the mileage of roads, bridge construction, etc., by actual convict labor. You can also understand that while we use convicts on portions of the road we have paid labor camps, etc., in other portions, which are more adapted to that kind of work.

CHAS. D. MILLER,
State Engineer.

Oregon

MARCH 7, 1912.

1. While the counties have used their prisoners on road work to some extent, the State had contracted the service of its convicts to a stone firm until 1911. This contract was broken in 1911, and the governor put the men to work in the field. The convicts are put entirely on their honor, no guards being sent with them, and only one man abused this confidence during the year. He was quickly recaptured. There is no particular law authorizing their use on highway construction, although one is now being prepared for initiative action at the next general election.

2. About one hundred.
3. Average cost of maintenance, 50 cents a day. No cost for guards, supervision, etc.
4. It is a little early to compare the effectiveness of this labor with paid workmen. So far the cost has been much below contract prices, for the convicts take great interest in the work and are trying to make a record both for efficiency and good behavior.
5. Excellent. Their health has been greatly improved, the man has been given an opportunity to learn a trade, and the appeal to their manhood is working wonders.
6. The men have been employed almost wholly in crushing stone in preparation for next year's construction, and it is impossible to get data as to the amount accomplished to date.

E. F. AYRES,
Highway Engineer.

Texas

MARCH 5, 1912.

1. No State convicts in Texas have actually been used on road construction. The State has had an iron foundry in connection with one of its penitentiaries, and a furniture and wagon factory in connection with the other, and has used a large number of convicts here. In addition to this, the State owns one or two large farms, and has used considerable number of convicts to cultivate these farms, and the remaining number have been leased out in mines and to big plantations. Happily this lease business has now been terminated entirely and the State is managing to employ all its convicts.

The law does not specifically authorize the use of State convicts on the public roads, and as no road work is now under the supervision of the State, it furnishes a hard problem for us. Governor O. B. Colquitt has believed that he had the authority to make arrangements with counties for the use of convicts on their road work on the payment of a nominal fee to the State penitentiary fund. A short time ago he offered the use of short term convicts to several of the leading counties of the State on condition that the county would support them, paying the penitentiary fund 25 cents per day for each man, and paying the convicts themselves 25 cents a day. Only such convicts as could be put out on their word of honor directly pledged to the governor, that they would not attempt to escape, were to be used. They were then to be worked without stripes and armed guards.

Some of these counties to whom the offer was made, refused outright to accept, and the others have been dallying with the proposition so that nothing has been done. The reasons of this refusal were mainly, first, the counties doubted the economy of the propo-

sition, and second, the people had voted bonds in expectation that they would be allowed to work either for the contractor or for the county direct, and thus earn back part of the cost. Hence, this made the use of convicts against their interest.

2. You will see from the above that no State convicts have been used in public road construction. Every county in the State has its own convicts for misdemeanor, and other minor offences below the rank of felony, and these are at the disposal of the county. In probably a majority of counties, these county convicts are used on the public roads, but as to the number, it would be impossible for me to give you any idea whatever, nor as to the cost of their upkeep or the effectiveness of their labor.

I enclose a statement from Ellis County, which makes a comparison between the convict labor with mules for hauling grader, and outfit consisting of Reeves steam engine, with similar graders. Ellis County is a typical black waxy county. They have an abundance of excellent gravel and are just about completing an excellent system of roads with its use.

This statement from Ellis County seems to assume that convict labor could not be used with engine and equipment. Brazos County, where the Agricultural and Mechanical College is located, is using a similar engine, pulling three graders, and the whole is operated by convict labor, aside from the foreman, and possibly one or two other employees.

ROBT. J. POTTS,
Professor of Highway Engineering,
A. & M. College of Texas.

County Auditor's Report. Ellis County, Texas

Mr. C. T. Spalding, County Auditor, Waxahachie, Texas

RELATIVE COST OF STEAM AND MULE CAMPS

Steam road camps\$3350.00 Mule and convict camps.... \$4975.00

RELATIVE COST OF OPERATING CAMPS

Steam camp		Mule and convict camp	
Engineer, per day.....	\$2.90	Foreman per day.....	\$1.73
Foreman per day.....	2.10	Three guards per day.....	2.89
Grader man per day.....	1.70	One cook.....	.97
Driver per day.....	1.70	Groceries, clothing, tobacco,	
Feed for water wagon team...	1.00	medicines, etc.....	6.91
Oil.....	.50	Feed for thirty head mules per	
Coal @ 35 cents per hundred		day.....	12.50
pounds.....	3.82		\$25.00
	\$13.72		

RELATIVE AMOUNT OF ROAD BUILT PER DAY PER MILE

Steam road camp	Mule and convict camp
72/100 miles per day, cost....\$13.72	$\frac{1}{4}$ mile per day, cost..... \$25.00
Total cost per mile..... 19.06	Total cost per mile..... 100.00

Virginia

FEBRUARY 27, 1912.

1. I would state that at present all the convicts in this State that have sentences of five years and under are worked on the public roads together with the inmates of the jails who have sentences long enough to make their use economical. We use convicts for almost every purpose in connection with the road work. Where they are employed they do all the manual labor. We frequently have a number driving teams, and wherever we have men qualified we use them for blacksmith work and for operating engines, drills and steam rollers. In the latter case we have seldom found it economical as the convict is apt to be careless about the use of machinery and the consequent unnecessary wear costs more than the employment of a more careful operator.

2. There was an average on the roads last year of 735 men per day.

3. The average cost per man for guarding, feeding and clothing was 34.3 cents per calendar day, or 50.48 cents per ten-hour working day. In addition to this, the supervision cost just about the same as the supervision of free labor.

4. I consider the convict labor worth at least 80 per cent of the best free labor and equivalent to the average local labor that is picked up for such work. The comparison of the effectiveness of the two classes of labor is well illustrated by the fact that of the roads built under the supervision of this department in 1911 the average cost per mile on the basis of 12 feet of macadam, of the roads built by free labor and under contract was \$4953.80. The average cost per mile of the same roads built with convict labor, counting the actual cost of maintenance of the convict labor, was \$3446.74.

5. As to the effect of such work upon the health and character of the convict, I will state that our experience has shown that the health of the men on the convict road force is better than that in either jails or the penitentiary. As to the moral side of the question, I would refer you to page 136 and following of the second annual report of the State board of charities and corrections of this State.

6. During the year 1911 there was constructed by convict labor 51.7 miles of macadam road, 21.9 miles of gravel road and 27.8 miles of sand clay or soil road. All the material for these macadam

roads was prepared by convict labor, and a number of small culverts and bridges connected with the work were built by convict labor.

P. ST. J. WILSON,
State Highway Commissioner.

Utah

APRIL 13, 1912.

Up to date we have found that convict labor that we have used in this State has been very beneficial. These convicts have done good work under the direction of some of our road engineers.

All the expense pertaining to convict labor is their subsistence, and transportation back and forth to the different counties that they work in.

We have no complaint at all of their work, and they accomplish as much as the ordinary laborer.

CALEB TANNER,
Secretary, State Road Commission.

Washington

Meskill Rock Quarry

MONTH	COST	CRUSHED AND CUBIC YARDS QUARRIED	COST PER CUBIC YARD
May.....	\$ 997.57	1045.5	\$0.950
June.....	1071.99	2290.5	0.466
July.....	1126.34	2002.0	0.560
August.....	1249.24	3289.5	0.378
September.....	1310.61	2689.5	0.483
Totals.....	\$5754.85	11317.0	Average.....0.504

The quarry was not started until May 10, 1910, which accounts for the high price during that month. Leaving out those figures the average price for quarrying and crushing is 46.3 cents. This cost includes sustenance, medical attention and cost of supervision and guards.

The other quarries were not operated enough to show any accurate cost data.

The State board of control reports that the men earned \$114,-139.79 during 1909-1910, an average of \$41.02 per month per man. The showing on the actual road construction is better.

State Road No. 8, Klickitat County.—The following work was done in 1910, the prices used as a basis for figuring being those paid by the North Bank Road which parallels this section of the highway.

2 acres clearing @ \$100.....	\$200.00
2306 cubic yards earth excavation @ 30 cents.....	691.80
52,180 cubic yards loose rock excavation @ 50 cents....	26,090.00
13,960 cubic yards solid rock excavation @ \$1.....	13,960.00
760 cubic yards rip-rap @ \$2.....	1,520.00
67 cubic yards concrete @ \$12.....	804.00
710 cubic yards third class masonry @ \$8.....	5,680.00
1200 cubic yards fourth class masonry @ \$4.....	4,800.00
Total cost at contract prices.....	\$53,745.80
Cost of camp, including powder, cement, etc.....	31,585.02
Net profit to State.....	\$22,160.78
Profit per day per man.....	\$1.87
Cost of sustenance at penitentiary, per man per day...	.13
Total profit per man.....	\$2.00

Some of the other roads, notably State road No. 6, did not show up so well. In fact this one came about even with contract prices.

E. F. AYRES,
Highway Engineer.

Wyoming

MARCH 31, 1912.

1. You ask whether or not convicts are actually used in making roads, or does the law authorize them only, will say we actually made roads with them last summer. I put twenty-six men out in camp for sixty days as an experiment, had one salaried man with them, did not have gun, lock or key of any description and housed them in tents only. Will in a few days go overland with thirty convicts about 300 miles to work all summer on the State roads, and will put another crew in the eastern part.

2. Will work about fifty men (our prison population is only 250 men, about 220 able-bodied) for seven months.

3. It cost last year for board, clothing and all other expenses \$0.387 per day per man. Board was 29 cents, other expenses nearly 10 cents, making the \$0.387.

4. All of the men gave me good services of eight hours per day.

5. There is no healthier work, and my men seemed to appreciate the privilege and most of them gave excellent service in return.

FELIX ALSTON,
Warden, State Penitentiary.

Convict Labor Publications

Convict labor on State Roads, *Engineering Record*, February 10, 1912.

Convict-built gravel roads, *Engineering Record*, February 24, 1912.

Convict road labor in Colorado, *Engineering Record*, December 16, 1912.

To adopt convict system of road making, Dalton, Ga., *Municipal Journal and Engineer*, September 20, 1911.

Convict labor and good roads, *The Contractor*, October 1, 1911.

Road building by convict labor in Davidson County Tenn., W. G. M. Campbell, *Good Roads*, January 6, 1912.

Orangeburg convicts built many roads, Columbia, S. C., Supervisor F. J. D. Felder, *Municipal Journal and Engineer*, December 28, 1911.

Convict labor for Adirondack roads, *American Motorist*, February, 1912.

Convicts and the public roads, *Southern Good Roads*, February, 1912.

Convict labor on road work, *Public Officials*, September 1910.

Is convict labor on roads in northern States economic?, *Engineering Contracting*, January 18, 1911.

Use of convicts on the public roads of Georgia, S. W. McCallie, *Engineering Record*, August, 5, 1911.

Roadmaking convicts, paper by Dr. E. Stagg Whitin before Good Roads Congress at Birmingham, Ala., *Engineering Record*, June 17, 1911.

Convict labor, *Michigan Roads and Forest*, July, 1911.

Convict labor on standard pavement, Col. C. L. Anderson, *Public Officials*, October 1910.

Convict labor on roads, Charles T. Lassiter, *Better Roads*, February 1912.

Road building by convict labor in Colorado, Thomas J. Tynan, Warden Colorado Penitentiary, *Good Roads*, November 4, 1911.

Twentieth annual report of the United States commission of labor, 1905.

PATENTS ISSUED BY UNITED STATES PATENT OFFICE IN 1911 PERTAINING TO ROADS

- 13,340. (Reissue.) *Harrow drag*. Wickliff B. Mitchell, Bedford, Ind., assignor, by mesne assignments, to Bedford Harrow-Drag Company, a Corporation. Filed September 18, 1911. Serial No. 650,010. Original No. 981,455, dated January 10, 1911. Serial No. 576,814.
- 980,393. *Road engine*. Gustaf Arvid Anderson, Waynesboro, Pa., assignor to The Geiser Manufacturing Company, Waynesboro, Pa. Filed December 20, 1909. Serial No. 534,043.
- 980,394. *Apparatus for maintaining crowned roads*. William C. Anderson, San José, Cal. Filed March 8, 1909. Serial No. 481,933.
- 980,442. *Draining culvert*. Julius H. Schlafly, Canton, Ohio, assignor to the Canton Culvert Company, Canton, Ohio, a Corporation of Ohio. Filed January 4, 1910. Serial No. 536,395.
- 980,510. *Wheeled scraper*. John H. Gerrer, East St. Louis, Ill., assignor to Maney Manufacturing Company, East St. Louis, Ill., a Corporation. Filed November 15, 1909. Serial No. 527,967.
- 980,513. *Means for laying dust and the like on and making roads*. Robert Hacking, West Bridgford, Nottingham, Harry Hill Ollerton, and Henry Walker Hill, Nottingham, England. Filed November 8, 1909. Serial No. 526,837.
- 980,754. *Attachment for road culverts*. George S. P. Brannen, Danforth, Me. Filed April 5, 1910. Serial No. 553,508.
- 981,437. *Surface scraper or grader*. Lemon M. Linder, Matthews, Indiana. Filed October 10, 1910. Serial No. 586,364.
- 981,517. *Tamping implement*. Hiram B. Andrews, Melrose, Mass., assignor of one-half to Joseph B. Simpson, Newton, Mass. Filed June 29, 1910. Serial No. 569,427.
- 981,685. *Process of making roadways, railroad beds, pavements, and the like*. Michael A. Popkess, Kansas City, Mo., assignor to Bituminized Road Company, Phoenix, Ariz., a Corporation of Arizona. Filed March 18, 1909. Serial No. 484,325.
- 981,710. *Road grader*. John T. Starr, Nowata, Okla. Filed August 9, 1909. Serial No. 512,051.
- 981,781. *Grading machine*. Thomas R. McKnight, Aurora, Ill., assignor to Western Wheeled Scraper Company, Aurora, Ill., a Corporation of Illinois. Filed July 15, 1908. Serial No. 443,684.
- 981,955. *Grading or sorting machine*. Gustav Thomas, Los Angeles, Cal. Filed June 22, 1910. Serial No. 568,298.
- 981,991. *Pontoon bridge*. Carl Abraham Forssell, Stockholm, Sweden. Filed October 6, 1910. Serial No. 585,556.
- 982,247. *Concrete roadway*. Edward M. Chadbourne, San Francisco, Cal. Filed July 19, 1910. Serial No. 572,728.
- 982,309. *Road scraper and grader*. George K. Smith and Ralph Russell, Albany, N. Y., and John Anderson, Jr., and Howard Grimes, Newcomb, N. Y. Filed November 12, 1910. Serial No. 592,107.
- 982,408. *Surfacing machine*. Guy Alloway, Seattle, Wash. Filed March 30, 1910. Serial No. 552,439.

- 982,427. *Road grader*. David P. Henninger, Redondo Beach, Cal. Filed August 4, 1910. Serial No. 575,398.
- 982,944. *Road grader*. John Brown Fender, Kaufman, Tex. Filed October 19, 1909. Serial No. 523,462.
- 983,065. *Wheel scraper*. Jefferson Kindleberger and Andrew J. Granville, San Diego, Cal. Filed November 19, 1909. Serial No. 528,956.
- 983,196. *Scraper for road engine wheels*. Gustaf Arvid Anderson, Waynesboro, Pa., assignor to The Geiser Manufacturing Company, Waynesboro, Pa. Filed December 20, 1909. Serial No. 534,042.
- 983,594. *Drag*. John E. Wright, Chicago, Ill. Filed October 3, 1910. Serial No. 585,027.
- 983,617. *Transfer or float bridge*. James B. French, Jamaica, N. Y. Filed July 16, 1910. Serial No. 572,382.
- 983,851. *Process of treating bituminous sand rock*. Henry F. Williams, San Francisco, Cal. Filed August 4, 1910. Serial No. 575,394.
- 983,959. *Excavating machine*. Hiram Walters and Nathan Bumpus, Curtrice, Ohio. Filed March 24, 1910. Serial No. 551,324.
- 984,171. *Rock drill*. Daniel Shaw Waugh, Denver, Colo., assignor to The Denver Rock Drill and Machinery Company, Denver, Colo. Original application filed May 26, 1908. Serial No. 435,113. Divided and this application filed April 2, 1909. Serial No. 487,464.
- 984,543. *Compound for forming paving*. David Crockett, Birmingham, Ala. Filed June 4, 1910. Serial No. 565,024.
- 984,634. *Combined scraper and drag*. Hiram S. Wood, Oskaloosa, Iowa. Filed June 15, 1910. Serial No. 567,056.
- 984,801. *Method of making pavements*. Cloyd Davis, Mineola, N. Y. Filed February 23, 1910. Serial No. 545,388.
- 985,035. *Form for the construction of concrete walks, floors, curbs, gutters, and like structures*. Mark Stewart Hotchkiss, Binghamton, N. Y. Filed December 7, 1910. Serial No. 596,075.
- 985,214. *Paving tool*. Aaron W. Shroyer, Durham, N. C. Filed October 4, 1910. Serial No. 585,177.
- 985,385. *Valve motion for rock drills*. Lewis C. Bayles, Johannesburg, Transvaal, assignor to Ingersoll-Rand Company, New York, N. Y., a Corporation of New Jersey. Filed February 1, 1910. Serial No. 541,290.
- 985,539. *Culvert*. Frank Ottney, Charlotte, Mich. Filed May 7, 1910. Serial No. 560,028.
- 985,546. *Scraping excavator and conveyor*. Joseph L. Potter, Indianapolis, Ind. Filed November 1, 1909. Serial No. 525,674.
- 985,628. *Train controlled highway signal*. Robert D. Peters, Knox, Ind. Filed August 6, 1909. Serial No. 511,570.
- 985,738. *Sheet-metal culvert*. Charles A. Foster, Portland, Oreg. Filed October 20, 1910. Serial No. 588,058.
- 986,113. *Road scarifier*. Edward Wright, Brooklyn, N. Y. Filed June 9, 1910. Serial No. 565,941.
- 986,290. *Road roller*. Pliny E. Holt, Stockton, Cal. Filed November 3, 1909. Serial No. 525,978.
- 987,060. *Paving block*. Frank Galgano, New Rochelle, N. Y. Filed June 29, 1910. Serial No. 569,573.
- 987,249. *Ditching machine*. Henry Matthies, Chicago, Ill. Filed July 11, 1910. Serial No. 571,271.
- 987,343. *Road machine for melting snow*. Clem M. Brooker, Lakewood, Ohio. Filed May 27, 1910. Serial No. 563,684.
- 987,352. *Apparatus for excavating and transporting soil and similar substances*. George E. Field, Comstock, N. Y., assignor of one-half to Atlantic, Gulf and Pacific Company, a Corporation of West Virginia. Filed September 15, 1908. Serial No. 453,199.

- 987,476. *Ditching and grading machine.* John D. Martin, Owensboro, Ky. Filed December 15, 1910. Serial No. 597,498.
- 987,612. *Excavator shovel.* Henry G. Butler. Kenosha, Wis. Filed December 20, 1909. Serial No. 534,068.
- 987,660. *Excavating machine.* Leonard C. Wood, Denver, Colo. Filed April 16, 1910. Serial No. 555,817.
- 987,726. *Process for making roads, pavements, etc.* Jules Lassailly, Issy-les-Moulineaux, France. Filed February 9, 1909. Serial No. 476,953.
- 987,803. *Road drag.* Edward J. Hickok, Chicago, Ill. Filed April 2, 1910. Serial No. 552,988.
- 987,879. *Combined curb and gutter finisher.* Alfred Horrabin, Iowa City, Iowa. Filed August 2, 1910. Serial No. 575,580.
- 987,937. *Ditching apparatus.* Joseph E. Wyckoff, Los Angeles, Cal. Filed May 24, 1910. Serial No. 563,219.
- 988,109. *Culvert.* Adolph Henry Kaufmann, Guthrie, Okla. Filed July 6, 1910. Serial No. 570,544.
- 988,483. *Road bed.* John McDermott, Dubuque, Iowa. Filed December 15, 1909. Serial No. 533,298.
- 988,601. *Scraper.* Jessie E. Smith, Fayetteville, Tennessee. Filed December 15, 1910. Serial No. 597,505.
- 988,684. *Grading machine.* Charles P. Ackerman, Albion, Nebr. Filed June 13, 1910. Serial No. 566,636.
- 988,764. *Pillar for bridges.* Carl Abraham Forssell, Stockholm, Sweden. Filed January 8, 1910. Serial No. 537,063.
- 988,788. *Mortar and concrete mixer.* Fred E. King, Hancock, Mich. Filed May 13, 1910. Serial No. 561,145.
- 988,883. *Earth excavating machine.* John H. Luethje, Des Moines, Iowa. Filed March 30, 1909. Serial No. 487,342.
- 989,035. *Traction engine.* Richard Parker and Wilmer Earnest Harrison, Uno Park, Ontario, Canada. Filed October 28, 1909. Serial No. 525,-163.
- 989,343. *Corrugated culvert.* Ferdinand J. Feldt, Peoria, Ill. Filed August 29, 1910. Serial No. 579,414.
- 989,861. *Ditching machine.* Sam Miller, Georgetown, Tex. Filed April 24, 1909. Serial No. 492,061.
- 989,898. *Spud for excavating machine.* James G. Fairbanks, Marion, Ohio. Filed July 12, 1910. Serial No. 571,625.
- 990,018. *Crushing machine.* Jerome Joseph Smiddy, Honolulu, Hawaii. Filed August 5, 1910. Serial No. 575,752.
- 990,157. *Grader.* Lawrence N. Morscher, Lawrence, Kans., assignor to William J. Ehrsam, Enterprise, Kans., and Lawrence N. Morscher, Lawrence, Kans., co-trustees. Filed October 23, 1908. Serial No. 459,155.
- 990,220. *Tamping apparatus.* Joseph W. Bragstad, Canton, S. D., assignor to The Bragstad Brothers Company, Canton, S. D., a Corporation of South Dakota. Filed January 18, 1911. Serial No. 603,280.
- 990,374. *Traction engine.* John M. Mittendorf, St. Louis, Mo. Filed September 22, 1909. Serial No. 518,977.
- 990,487. *Excavating machine.* Charles L. Lilleberg, Chicago, Ill. Filed June 8, 1908. Serial No. 437,244.
- 990,488. *Road grader.* John S. Lord, Ogden, Iowa. Filed January 23, 1911. Serial No. 604,186.
- 990,513. *Machine for use in street paving work.* Charles E. Bathrick, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. Filed May 14, 1909. Serial No. 496,013.
- 990,579. *Traction wheel.* Adolph H. Meyer, Pukwana, S. D. Filed May 19, 1909. Serial No. 497,083.

- 990,633. *Rock pulverizing machine.* Alfred Godfrey Campbell, Sherbrooke, Quebec, Canada. Filed October 20, 1910. Serial No. 588,146.
- 990,782. *Apparatus for preparing paving material.* Herman J. Rufi, Indianapolis, Ind., assignor to The American Paving and Manufacturing Company of Indianapolis, Indianapolis, Ind., a Corporation of Indiana. Filed February 23, 1909. Serial No. 479,580.
- 990,846. *Road roller.* Henry F. Crandall, Racine, Wis., assignor to J. I. Case Threshing Machine Company, Racine, Wis., a Corporation. Filed January 9, 1911. Serial No. 601,619.
- 990,847. *Road roller.* Henry F. Crandall, Racine, Wis., assignor to J. I. Case Threshing Machine Company, Racine, Wis., a Corporation. Filed January 9, 1911. Serial No. 601,620.
- 991,043. *Process of Making roadways.* Joseph E. Ward, Longbeach, Cal. Filed March 14, 1910. Serial No. 549,347.
- 991,083. *Excavating and separating apparatus.* Oscar B. Perry, New York, N. Y. Filed January 29, 1910. Serial No. 540,917.
- 991,172. *Culvert.* George A. Sagendorph, Newton, Mass., assignor to The Penn Metal Ceiling and Roofing Company, Limited, a Corporation of Pennsylvania. Filed January 4, 1911. Serial No. 600,779.
- 991,396. *Traction wheel.* Jacob S. Ulfers, Beach, N. D. Filed December 13, 1910. Serial No. 597,172.
- 991,477. *Crusher and pulverizer.* Frank L. Buchanan, St. Louis, Mo., assignor to Frank L. Buchanan Mining Machinery Manufacturing Company, St. Louis, Mo., a Corporation of Missouri. Filed September 4, 1909. Serial No. 516,221.
- 991,696. *Drainage excavator.* Morton G. Bunnell, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. Filed December 10, 1908. Serial No. 466,809.
- 992,211. *Traction engine.* Claus Hinrich Kohn, Stade, Germany, assignor of one-half to Ernst Taubert, Leipzig, Germany. Filed July 31, 1909. Serial No. 510,611.
- 992,346. *Rotary excavator.* Thomas Fahey, Spokane, Wash. Filed June 28, 1910. Serial No. 569,609.
- 992,538. *Apparatus for and process of laying paving material.* William Bayley, Springfield, Ohio. Filed April 5, 1909. Serial No. 488,107.
- 992,573. *Armored paving.* Peter P. McMenamin, Jersey City, N. J. Filed December 10, 1909. Serial No. 532,368.
- 992,574. *Interlocking armored paving.* Peter P. McMenamin, Jersey City, N. J. Filed August 3, 1910. Serial No. 575,256.
- 992,649. *Concrete spreader for ditches, sidewalks, and other surfaces.* George W. Gale, Greeley, Colo. Filed December 19, 1910. Serial No. 598,234.
- 992,679. *Excavator.* William Gray Lawrence, Crescent City, Ill., assignor of one-half to John C. Vanatta, Brookston, Ind. Filed February 9, 1910. Serial No. 542,852.
- 992,866. *Ditching machine.* Horace G. Francis, Dexter, Mo., assignor, by direct and mesne assignments, of one-half to Emmett S. Wills and one-fourth to James K. Robinson, Dexter, Mo. Filed May 16, 1910. Serial No. 561,632.
- 992,871. *Combination shovel, plow, and scraper.* Earl Thomas Harvey, Salt Lake City, Utah. Filed May 24, 1910. Serial No. 563,050.
- 992,994. *Reinforced I-beam.* Herbert L. Smith, Clinton, Mass., assignor to Clinton Wire Cloth Company, Boston, Mass. Filed March 4, 1910. Serial No. 547,259.
- 993,014. *Valve motion for rock drills.* Lewis C. Bayles, Johannesburg, Transvaal, assignor to Ingersoll-Rand Company, New York, N. Y., a Corporation of New Jersey. Filed February 1, 1910. Serial No. 541,289.

- 993,218. *Valve motion for rock drills.* Lewis C. Bayles, Johannesburg, Transvaal, assignor to Ingersoll-Rand Company, New York, N. Y., a Corporation of New Jersey. Original application filed February 1, 1910, Serial No. 541,289. Divided and this application filed November 2, 1910. Serial No. 590,354.
- 993,424. *Throttle valve for rock drills.* Daniel S. Waugh, Denver, Colo., assignor to The Denver Rock Drill & Machinery Company, Denver, Colo. Filed October 18, 1909. Serial No. 523,271.
- 993,487. *Road scraper.* Jacob Williamson, Ava, Ill. Filed November 5, 1910. Serial No. 590,938.
- 993,618. *Apparatus for treating roads.* Henry K. Potter, Boston, Mass., assignor to Studebaker Brothers Manufacturing Company, South Bend, Ind., a Corporation. Filed October 21, 1910. Serial No. 588,337.
- 993,650. *Elevator drag.* Charles F. Clements, Peoria, Ill., assignor to Camp Brothers Company, Washington, Ill., a Corporation of Illinois. Filed September 23, 1907. Serial No. 394,097. Renewed May 11, 1908. Serial No. 432,280.
- 993,706. *Excavating machine.* Edward J. Mundale, Frost, Minn. Filed June 22, 1910. Serial No. 568,305.
- 993,785. *Excavator.* Richard P. McCormick, Granite, Md. Filed August 15, 1910. Serial No. 577,151.
- 993,864. *Scraper.* Lewis M. Oden, Raleigh, N. C. Filed September 1, 1910. Serial No. 579,999.
- 994,004. *Apparatus for elevating, transporting, and discharging material.* Nickoline Johnson, Milwaukee, Wis., administratrix of Ole Johnson, deceased. Filed January 15, 1909. Serial No. 472,405.
- 994,092. *Concrete roadway.* Edward M. Chadbourne, San Francisco, Cal. Filed March 17, 1911. Serial No. 615,134.
- 994,113. *Excavating tool.* Ralph A. Bonnell, Chicago, Ill. Filed April 11, 1908. Serial No. 426,587.
- 994,200. *Collapsible molding device for culverts, etc.* George W. Riker, Russell, Iowa. Filed April 6, 1910. Serial No. 553,779.
- 994,317. *Traction engine.* Pliny E. Holt, Stockton, Cal. Filed January 19, 1909. Serial No. 473,194.
- 994,348. *Traction wheel.* Marquis J. Todd, Buffalo, N. Y., assignor to Buffalo Pitts Company, Buffalo, N. Y., a Corporation of New York. Filed March 9, 1910. Serial No. 548,282.
- 994,380. *Excavator.* James Peter Farrelly, Toronto, Ontario, Canada. Filed November 12, 1907. Serial No. 401,878. Renewed November 4, 1910. Serial No. 590,750.
- 994,600. *Drainage system.* Charles W. Osborne, Lubbock, Tex. Filed October 12, 1910. Serial No. 586,628.
- 994,617. *Drainage system.* Harry H. Sutro, New York, N. Y. Filed January 15, 1907. Serial No. 352,474.
- 994,731. *Ditching machine.* Otto Cliff Parks, Billings, Mont. Filed November 11, 1910. Serial No. 591,809.
- 994,942. *Excavating machine.* John H. W. Libbe, Toledo, Ohio. Filed July 5, 1910. Serial No. 570,241.
- 995,044. *Head-adjusting device for gyratory stone crushers.* Edgar B. Symons, Milwaukee, Wis., assignor to Smith & Post Co., Milwaukee, Wis., a Corporation of Wisconsin. Filed December 27, 1909. Serial No. 535,227.
- 995,147. *Composite pavement.* Harry G. Jennison, Toledo, Ohio. Filed January 17, 1910. Serial No. 538,348.
- 995,180. *Culvert.* Marshall A. Quinn and Lyman C. Stewart, Roanoke, Va. Filed March 7, 1911. Serial No. 612,754.
- 995,207. *Culvert.* George W. Storms, Louisville, Ky. Filed November 7, 1910. Serial No. 591,176.

- 995,210. *Rock drill*. Thomas Edgar Adams, Cleveland, Ohio. Filed July 15, 1909. Serial No. 507,859.
- 995,285. *Tooth for excavating buckets*. Edward Louis Pemberton, New Haven, Conn. Filed January 18, 1911. Serial No. 603,257.
- 995,529. *Culvert mold*. Arthur J. Fox, Almont, Mich. Filed September 26, 1910. Serial No. 583,828.
- 995,538. *Traction motor*. John B. Heverling, St. Louis, Mo. Filed March 7, 1910. Serial No. 547,871.
- 995,580. *Crushing machine*. Thomas Leggett Sturtevant, Quincy, and Thomas Joseph Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Company, a Corporation of Maine. Filed July 3, 1908. Serial No. 441,857.
- 995,614. *Valve mechanism for rock drills*. Fordyce C. Loomis, New Philadelphia, Ohio. Filed April 17, 1909. Serial No. 490,521.
- 995,630. *Knockdown metal form for concrete sidewalks*. Harry M. Naugle, Canton, Ohio, assignor to The Berger Manufacturing Company, Canton, Ohio, a Corporation of Ohio. Filed May 20, 1910. Serial No. 562,464.
- 995,659. *Concrete culvert*. Robert J. Burns, Hewitt, Okla. Filed March 31, 1911. Serial No. 618,086.
- 995,813. *Bridge*. Joseph B. Strauss, Chicago, Ill., assignor to The Strauss Bascule and Concrete Bridge Company, Chicago, Ill., a Corporation of Illinois. Filed December 18, 1905. Serial No. 292,208.
- 996,166. *Metallic culvert*. Karl Johan Thorsby, Oakland, Cal., assignor to California Corrugated Culvert Company, Oakland, Cal., a Corporation. Filed March 6, 1911. Serial No. 612,481.
- 996,513. *Road and process of making it*. Edward Alfred Paterson, Port Arthur, Ontario, Canada. Original application filed June 20, 1910, Serial No. 567,959. Divided and this application filed January 20, 1911. Serial No. 603,689.
- 996,703. *Corrugated culvert*. Ferdinand J. Feldt, Peoria, Ill., Filed April 12, 1911. Serial No. 620,570.
- 996,807. *Apparatus for shaping and sharpening rock drill bits*. William H. Smyth, Berkeley, Cal. Filed January 20, 1906. Serial No. 297,076. Renewed May 25, 1911. Serial No. 629,486.
- 996,913. *Excavating machine*. Francis Donaldson, Yonkers, N. Y. Filed August 4, 1910. Serial No. 575,606.
- 997,052. *Excavator*. Charles A. Frayer, Toledo, Ohio, assignor to The Vulcan Steam Shovel Company, Toledo, Ohio, a Corporation of Ohio. Filed January 20, 1910. Serial No. 539,046.
- 997,166. *Road map*. Philip Weber, Genoa Junction, Wis. Filed September, 14, 1910. Serial No. 581,998.
- 997,382. *Culvert structure*. Charles A. Foster, Portland, Oregon. Filed December 19, 1910. Serial No. 598,258.
- 997,383. *Culvert*. Charles A. Foster, Portland, Oregon. Filed December 19, 1910. Serial No. 598,259.
- 997,533. *Apparatus for use in building illuminating pavements*. Stanislaus Zacharias, Detroit, Mich. Filed March 22, 1909. Serial No. 484,860.
- 997,542. *Excavating machine*. Morton G. Bunnell, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. Filed September 2, 1908. Serial No. 451,296.
- 997,543. *Excavator*. Morton G. Bunnell, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. Filed October 15, 1909. Serial No. 522,-749.
- 997,591. *Rock drill*. Warren Wood, Paterson, N. J. Filed January 20, 1911. Serial No. 603,711.
- 997,638. *Pavement breaking machine*. Eugene Rynearson. Dallas, Tex. Filed August 13, 1910. Serial No. 577,005

- 997,918. *Rock crusher.* Adolph W. Jones, Oakland, Cal. Filed February 23, 1910. Serial No. 545,501. Renewed December 29, 1910. Serial No. 600,085.
- 998,029. *Excavating machine.* Alexander M. Munn, Nebraska City, Nebr. Filed February 24, 1910. Serial No. 545,661.
- 998,228. *Road scraper.* Henry C. Barnett, Jefferson, Ga. Filed March 7, 1911. Serial No. 612,746.
- 998,308. *Excavating machine.* Otto W. Siebenhaar, Fond du Lac, Wis., assignor of one-half to B. F. & H. L. Sweet Company, Fond du Lac, Wis., a Corporation of Wisconsin. Filed November 8, 1909. Serial No. 526,699.
- 998,523. *Bridge.* William H. Jones, Leavenworth, Kans., assignor to The Missouri Valley Bridge and Iron Company, Leavenworth, Kans., a Corporation of Kansas. Filed April 24, 1911. Serial No. 622,851.
- 998,569. *Process for the manufacture of asphalt.* Chauncey B. Forward, Urbana, Ohio. Filed July 11, 1910. Serial No. 571,293.
- 998,680. *Grading machine.* Charles Bushnell Dunn, Birmingham, Ala. Filed January 25, 1911. Serial No. 604,694.
- 998,704. *Surface drain.* Daniel B. Luten, Indianapolis, Ind. Filed January 3, 1911. Serial No. 600,480.
- 998,740. *Road scraper.* George J. Bender, deceased, Galena, Ill., by Anna C. Bender, executrix, Galena, Ill., assignor to John G. Chalmers, Dubuque, Iowa. Filed December 22, 1910. Serial No. 598,869.
- 998,818. *Excavating machine.* Joseph Walton, Denver, Colo. Filed May 12, 1910. Serial No. 560,820.
- 998,910. *Rock drilling machine.* Paul Lange, Brieg, near Breslau, Germany. Original application filed February 16, 1909. Serial No. 748,196. Divided and this application filed January 28, 1911. Serial No. 605,275.
- 999,173. *Road bed.* Sherman Mahurin, Frankfort, S. D. Filed September 24, 1910. Serial No. 583,636.
- 999,896. *Machine for splitting or other working of stones and the like.* Carl Gustaf Smith, Stockholm, Sweden. Filed September 21, 1909. Serial No. 518,845.
- 999,934. *Road grader.* Cornelius E. Whitehead, Olla, La. Filed December 8, 1910. Serial No. 596,287.
- 999,953. *Excavating machine.* Joseph C. Boehm, Chicago, Ill. Filed January 28, 1911. Serial No. 605,267.
- 1,000,049. *Stone crusher.* Edgar B. Symons, Milwaukee, Wis., assignor to Smith & Post Company, Milwaukee, Wis., a Corporation of Wisconsin. Filed May 27, 1907. Serial No. 375,762.
- 1,000,130. *Rock drill.* James A. Thompson and Edwin M. Mackie, Franklin, Pa., assignors to Chicago Pneumatic Tool Company, Chicago, Ill., a Corporation of New Jersey. Original application filed November 22, 1906. Serial No. 344,568. Divided and this application filed November 21, 1908. Serial No. 463,871.
- 1,000,263. *Excavating mechanism.* Hollis H. Harris, Lorain, Ohio, assignor to The Thew Manufacturing Company, Lorain, Ohio, a Corporation of Ohio. Filed January 31, 1911. Serial No. 605,813.
- 1,000,520. *Bituminous paving.* George P. Hemstreet, Hastings-upon-Hudson, N. Y., assignor to The International Pavement Company, Hartford, Conn., a Corporation of Connecticut. Filed February 18, 1905. Serial No. 246,333.
- 1,000,677. *Excavating and conveying apparatus.* Judson Hayward, Hackensack, N. J. Filed December 22, 1909. Serial No. 534,417.
- 1,000,818. *Core for making culverts.* John W. Kempf, Goehner, Nebr. Filed December 17, 1910. Serial No. 597,810.
- 1,000,913. *Roller crushing and grinding mill.* John E. Hovendick, Blair, Nebr. Filed December 19, 1910. Serial No. 598,022.

- 1,000,988. *Excavating and loading apparatus.* Ira E. Burkett. Macon, Ga. Filed November 25, 1910. Serial No. 594,194.
- 1,001,012. *Pneumatically operated rock drilling engine.* George A. Fowler, Denver, Colo. Filed May 19, 1910. Serial No. 562,151.
- 1,001,014. *Road oiler.* Walter S. French, Moorestown, N. J. Filed July 27, 1910. Serial No. 574,033.
- 1,001,289. *Excavating dipper.* Walter S. McKee, Glencoe, Ill., and Percival M. Vilas, Minneapolis, Minn., assignors to Edgar Allen American Manganese Steel Company, Augusta, Me., a Corporation of Maine. Filed January 9, 1911. Serial No. 601,687.
- 1,001,378. *Corrugated culvert.* Ferdinand J. Feldt, Peoria, Ill. Filed June 20, 1910. Serial No. 567,806.
- 1,001,545. *Rock drill making and sharpening machine.* Martin McHale, Phoenix, British Columbia, Canada. Filed July 16, 1910. Serial No. 572,312.
- 1,001,695. *Pavement.* August E. Schutte. Newton, Mass. Filed October 13, 1910. Serial No. 586,828.
- 1,001,800. *Trunnion bascule bridge.* Alexander F. L. von Babo, Chicago, Ill. Filed June 26, 1908. Serial No. 440,475.
- 1,001,903. *Rock cutting apparatus.* Robert Temple, Denver, Colo., assignor to The Temple Engineering Company, Denver, Colo., a Corporation of Colorado. Filed September 16, 1907. Serial No. 393,212.
- 1,001,978. *Culvert.* Fred Olson, Clyde, Kans. Filed May 29, 1911. Serial No. 630,202.
- 1,002,043. *Traction engine.* Dorcy Olen De Witt, Aberdeen, S. D. Filed May 9, 1908. Serial No. 431,790.
- 1,002,148. *Excavator.* Hollis H. Harris, Lorain, Ohio. Filed January 31, 1911. Serial No. 605,816.
- 1,002,261. *Stone crusher.* Howard Forrest Gorsuch, Columbus, Ohio. Filed April 5, 1911. Serial No. 619,147.
- 1,002,665. *Traction wheel.* Max Froehlich, Rasatatt, Germany, assignor, by direct and mesne assignments, of one-half to Rudolph H. Froehlich and one-sixth to Robert B. Gregg, Stuttgart, Ark., and one-third to Edward C. Post, Ann Arbor, Mich. Filed January 12, 1910. Serial No. 537,666.
- 1,002,685. *Excavating mechanism.* Hollis M. Harris, Lorain, Ohio, assignor to The Thew Automatic Shovel Company, Lorain, Ohio, a Corporation of Ohio. Filed March 22, 1911. Serial No. 616,254.
- 1,002,732. *Excavating system.* Charles A. Morris, Montclair, N. J. Filed May 31, 1910. Serial No. 564,076.
- 1,002,733. *Excavating shovel.* Charles A. Morris, Montclair, N. J. Filed August 5, 1910. Serial No. 575,748.
- 1,002,786. *Rock cutter.* Robert Temple, Denver, Colo., assignor to The Temple Engineering Company, Denver, Colo., a Corporation of Colorado. Filed May 27, 1907. Serial No. 375,971.
- 1,002,894. *Safety excavator cover.* William Bartholomew, Chicago, Ill., assignor to Troy Laundry Machinery Company, Limited, Chicago, Ill., a Corporation of New York. Filed January 6, 1911. Serial No. 601,196.
- 1,002,944. *Concrete arch bridge.* Claude A. P. Turner, Minneapolis, Minn. Filed October 28, 1908. Serial No. 459,955.
- 1,002,945. *Short span flat slab bridge.* Claude A. P. Turner, Minneapolis, Minn. Filed October 1, 1909. Serial No. 520,592.
- 1,003,025. *Traction device.* George Elias Baker, Reed City, Mich. Filed April 23, 1910. Serial No. 557,270.
- 1,003,028. *Ditching machine.* Benjamin Bowman, Springfield, Mo. Filed October 25, 1909. Serial No. 524,409.

- 1,003,040. *Apparatus for and method of treating asphalt solutions for the production of asphalt cement and the recovery of the lighter products.* Franklin H. Dunham, Los Angeles, Cal. Filed February 18, 1908. Serial No. 416,611.
- 1,003,046. *Ditching machine.* D. Maurice Hartsough, Minneapolis, Minn. Filed July 1, 1910. Serial No. 569,995.
- 1,003,149. *Excavator.* Israel Pascal, Montreal, Quebec, Canada, assignor of one-fourth to Charles Pascal, one-fourth to George Antoine Bilot, and one-fourth to Lyon William Jacobs, Montreal, Canada. Filed December 16, 1910. Serial No. 597,696.
- 1,003,307. *Drainage system.* Charles Walker, Knoxville, Tenn. Filed February 13, 1911. Serial No. 608,434.
- 1,003,458. *Excavating machine.* Denis F. Hogan, St. Paul, Minn. Filed November 28, 1910. Serial No. 594,424.
- 1,003,500. *Traction wheel.* William S. Plummer, St. Louis, Mo. Filed September 29, 1910. Serial No. 584,553.
- 1,003,759. *Culvert.* Albert Lauritzen, Charlotte, Mich. Filed April 21, 1911. Serial No. 622,519.
- 1,003,840. *Pavement.* John O. Wilhelm, Portland, Oreg. Filed March 31, 1910. Serial No. 552,684.
- 1,003,901. *Fluid conduit for lift bridges.* John Lyle Harrington, Kansas City, Mo. Filed October 10, 1910. Serial No. 586,311.
- 1,004,128. *Road smoother and grader.* William H. Wilson, Marceline, Mo. Filed October 11, 1909. Serial No. 521,984.
- 1,004,313. *Traction wheel.* Cisco R. Traxler, Winston Salem, N. C., assignor to American Farm Tractor Co., New York, N. Y., a Corporation of Delaware. Filed December 1, 1909. Serial No. 530,732.
- 1,004,549. *Excavating machine.* Leonard C. Wood, Alden, Iowa. Filed September 9, 1910. Serial No. 581,210.
- 1,004,663. *Rock crusher.* John M. Landrum, East Lake, Ala., assignor of one-half to James T. Harwell, Birmingham, Ala. Filed November 19, 1910. Serial No. 593,173.
- 1,004,715. *Means for elevating and handling dirt, sand, or the like.* Joseph J. Valiquette and Charles F. Roush, Toledo, Ohio. Original application filed June 30, 1910, Serial No. 565,654. Divided and this application filed October 22, 1910. Serial No. 588,555.
- 1,004,730. *Machine for chopping up asphalt or like pavement.* Charles E. Bathrick, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. Filed August 30, 1909. Serial No. 515,296.
- 1,004,866. *Culvert.* John Gibson, Fromberg, Mont. Filed March 9, 1911. Serial No. 613,259.
- 1,004,882. *Road bed equipment.* John D. Kneedler, Sioux City, Iowa, assignor of two-fifths to Buel Couch and one-fifth to N. T. Hanson, Sioux City, Iowa. Filed January 7, 1911. Serial No. 601,280.
- 1,005,358. *Crushing machine.* Edgar B. Symons, Milwaukee, Wis., assignor to Smith and Post Company, Milwaukee, Wis., a Corporation of Wisconsin. Filed November 8, 1906. Serial No. 342,443.
- 1,005,544. *Cutter for excavators.* John Sheldon Henderson, Los Angeles, Cal., assignor of one-third to Valdemar Schmidt and one-third to Helm Schmidt, Los Angeles, Cal. Filed February 23, 1911. Serial No. 610,322.
- 1,005,656. *Metal culvert.* Joseph A. Sanders, Cayuga, Ind., assignor to Forris L. Saunders and Frank M. Malone, Cayuga, Ind. Filed April 29, 1909. Serial No. 492,896.
- 1,005,946. *Road drag.* George O. Emerson, Wenonda, Va. Filed March 1, 1911. Serial No. 611,583.
- 1,006,139. *Road machine.* Marion Marcellus Sickler, Pala, Cal. Filed December 30, 1910. Serial No. 600,146.

- 1,006,143. *Crushing machine*. Edward J. Steckle, Dixon, Ill., assignor of one-third to Charles J. Reilly, Syracuse, Ind., and one-third to William E. Wuerth, Dixon, Ill. Filed May 31, 1911. Serial No. 630,332.
- 1,006,146. *Grading machine*. William Sykes, Jackson, Miss. Filed July 15, 1910. Serial No. 572,220.
- 1,006,339. *Rock drill*. Thomas Edgar Adams, Cleveland, Ohio. Filed August 12, 1908. Serial No. 448,228.
- 1,006,576. *Road grader*. Frank W. Mattson, Cumberland, Wis. Filed May 25, 1910. Serial No. 563,422.
- 1,006,661. *Rock drill*. Moses Arthur Knapp, Oakland, Cal. Filed February 7, 1910. Serial No. 542,452.
- 1,007,059. *Crushing machine*. William A. Box, Denver, Colo. Filed April 20, 1908. Serial No. 428,093.
- 1,007,190. *Safety gate for bridges*. Casper Faust, Oshkosh, Wis. Filed June 5, 1911. Serial No. 631,304.
- 1,007,216. *Rock drill mounting*. Edwin M. Mackie and Percival F. Doyle, Franklin, Pa., assignors to Chicago Pneumatic Tool Company, Chicago, Ill., a Corporation of New Jersey. Filed August 10, 1908. Serial No. 447,734.
- 1,007,248. *Rock drill extractor*. Earl K. Smith, Tonopah, Nev. Filed December 21, 1910. Serial No. 598,507.
- 1,007,287. *Art of constructing concrete walls, subways, etc., in the earth*. George W. Jackson, Chicago, Ill. Filed February 18, 1910. Serial No. 544,527.
- 1,007,299. *Bridge*. John A. Lynch, Spokane, Wash. Filed April 30, 1910. Serial No. 558,543.
- 1,007,536. *Hand tamper*. Ward W. Cooley, Clinton, Iowa. Filed December 20, 1910. Serial No. 598,305.
- 1,007,621. *Paving block*. Thomas A. Womack, Baton Rouge, La. Filed August 1, 1910. Serial No. 574,854. Renewed April 26, 1911. Serial No. 623,465.
- 1,007,689. *Portable asphalt plant*. Charles E. Guelich, Chicago, Ill. Filed March 14, 1908. Serial No. 421,006.
- 1,007,831. *Asphalt press*. George E. Whitney, Yonkers, N. Y., assignor to The International Pavement Company, Hartford, Conn., a Corporation of Connecticut. Filed October 30, 1906. Serial No. 341,335.
- 1,007,832. *Art of manufacturing compressed asphalt paving-blocks*. George E. Whitney, Yonkers, N. Y., assignor to George B. Upham, Boston, Mass. Filed April 23, 1910. Serial No. 557,276.
- 1,007,833. *Manufacture of compressed asphalt paving blocks*. Walter S. Wilkinson, Wytheville, Va., assignor to George B. Upham, Boston, Mass. Filed March 11, 1910. Serial No. 548,673.
- 1,007,935. *Crusher*. John P. Fox, Pittsburgh, Pa. Filed March 8, 1911. Serial No. 613,045.
- 1,008,076. *Portable pneumatic reversible drilling machine*. Charles Schofield, Newcastle-upon-Tyne, England. Filed June 7, 1909. Serial No. 500,472.
- 1,008,114. *Ditching machine*. Newton F. Chamberlin, Libertyville, Ill. Filed December 6, 1910. Serial No. 595,883.
- 1,008,396. *Sidewalk form*. Joseph Urbink, Port Washington, Wis. Filed March 24, 1910. Serial No. 551,262.
- 1,008,765. *Ditching machine*. Daniel G. Woods, New Orleans, La. Filed May 24, 1910. Serial No. 563,142.
- 1,009,117. *Apparatus for the distribution of concrete or the like*. Frank E. Walters, Toledo, Ohio. Filed May 11, 1911. Serial No. 626,555.
- 1,009,376. *Shell for rock drilling machines*. Lewis C. Bayles, Johannesburg, Transvaal, assignor to Ingersoll-Rand Company, New York, N. Y., a Corporation of New Jersey. Filed October 28, 1909. Serial No. 525,003.

- 1,009,520. *Crushing-head for ore and rock crushers.* Harry A. Hunt, Glen Gardner, N. J., assignor to Taylor Iron & Steel Company, High Bridge, N. J., a Corporation of New Jersey. Filed November 6, 1909. Serial No. 526,493.
- 1,009,532. *Excavating apparatus.* Christian H. Kreiling, Chandlerville, Ill. Filed May 23, 1910. Serial No. 562,890.
- 1,009,805. *Asphalt distributor.* William P. Tarrant, Saratoga Springs, N. Y. Filed April 8, 1910. Serial No. 554,109.
- 1,009,843. *Scraping and grading machine.* Samuel E. Kennedy, San Jacinto, Cal. Filed March 4, 1911. Serial No. 612,347.
- 1,010,114. *Machine for mixing tar macadam.* Edward W. Brackenbury, Milwaukee, Wis., assignor to The T. L. Smith Co., Milwaukee, Wis., a Corporation of Wisconsin. Filed June 8, 1910. Serial No. 565,685.
- 1,010,209. *Construction or preparation of road surfaces and pavements.* Karl Ludwig Valentin Zimmer, Hamburg, Germany. Filed April 23, 1910. Serial No. 557,277.
- 1,010,450. *Metal Culvert.* John Olsen, Lyle, Minn. Filed July 24, 1911. Serial No. 640,072.
- 1,010,875. *Culvert.* Otto E. Deppen, Chattanooga, Tenn. Filed Sept. 12, 1911. Serial No. 648,863.
- 1,010,977. *Crushing machine.* Edgar B. Symons, Milwaukee, Wis. Filed April 17, 1911. Serial No. 621,483.
- 1,010,988. *Traction engine.* James H. Venners, Brooklyn, N. Y., assignor of one-half to William L. Millsbaugh, Brooklyn, N. Y. Filed August 31, 1910. Serial No. 579,827.
- 1,011,120. *Ditch gate.* Adoniram J. Collar, Yreka, Cal. Filed April 17, 1911. Serial No. 621,669.
- 1,011,196. *Grader.* Charles H. Herscy, Chicago, Ill., assignor to Armour & Company, Chicago, Ill., a Corporation of Illinois. Filed December 10, 1909. Serial No. 532,303.
- 1,011,230. *Road smoother.* Walter P. Moore, San Diego, Cal. Filed June 14, 1911. Serial No. 633,084.
- 1,011,547. *Tooth for excavators or the like.* Michel J. Woznack, Seattle, Wash. Filed July 24, 1911. Serial No. 640,341.
- 1,011,841. *Portable electric rock drill.* John Albert Pierson, Pigeon Cover, Mass. Filed May 17, 1911. Serial No. 627,853.
- 1,011,994. *Excavating machine.* Edward O'Toole, Gary, W. Va. Filed June 28, 1910. Serial No. 569,360.
- 1,011,995. *Excavating machine.* Edward O'Toole, Gary, W. Va. Filed August 17, 1910. Serial No. 577,587. Renewed October 19, 1911. Serial No. 655,641.
- 1,012,087. *Boom for excavating machines.* George W. King, Harry J. Barnhart, and Charles B. King, Marion, Ohio, assignors to The Marion Steam Shovel Company, Marion, Ohio, a Corporation of Ohio. Filed October 18, 1909. Serial No. 523,118.
- 1,012,109. *Grading machine.* Charles K. Stockland, Minneapolis, Minn. Filed December 27, 1910. Serial No. 599,300.
- 1,012,189. *Ditch making machine.* Martin H. Blanchard, Davisville, Cal. Filed January 24, 1910. Serial No. 539,824.

TRADE NAMES

- Acme Asphalt*: Trade name given to asphalt cement produced by Warren Brothers Company, 59 Temple Place, Boston, Massachusetts (advertisement page 441).
- Amiesite*: Amies Road Company, Drake Building, Easton, Pennsylvania. A mixture of crushed stone or gravel and bituminous cement which is so prepared by the manufacturers that it may be spread and rolled without heating (advertisement page 409).
- Asfaltoil*: Gulf Refining Company, 514 Battery Park, New York, New York. The trade name for several grades of fluid reduced petroleum for use in the surface treatment of roads.
- Asphaltoilene*: The Good Roads Improvement Company, First National Bank Building, Cincinnati, Ohio. The trade name of several grades of reduced and residual petroleum and oil asphalt manufactured by this company for use in hot and cold surface treatment and in the construction of roads.
- Aztec*: United States Asphalt Refining Company, 90 West Street, New York, New York. An oil asphalt produced from Mexican crude petroleum.
- Bermudez Road Asphalt*: Barber Asphalt Paving Company, Philadelphia, Pennsylvania. Fluxed Bermudez Lake asphalt for use in road construction (advertisement page 416.)
- Bicomac*: Headley Good Roads Company, Real Estate Trust Building, Philadelphia, Pennsylvania. An emulsified bitumen which is diluted with water and mixed with Portland cement concrete in the surfacing of roads (advertisement page 415).
- Bitulithic*: Warren Brothers Company, 59 Temple Place, Boston, Massachusetts. Trade name of a patented pavement construction consisting of varying sizes of crushed stone or gravel mixed with bituminous cement, the sizes of crushed stone varying from a maximum which is about one-half the depth of the pavement surface (which surface is generally 2 inches deep) to impalpable powder, being so prepared as to give a high degree of density and low percentage of voids (advertisement page 441).
- Bitustone Double Bond*: A pavement construction patented by August E. Schutte of Northboro, Massachusetts, consisting of a concrete foundation of a depth of about $3\frac{1}{2}$ inches, and bonding course about $1\frac{1}{2}$ inches, and the spaces in the bonding course filled and the surface coated with asphaltic cement, prepared for the purpose, the surface finally finished with crusher screenings or coarse sand spread into the hot bitumen. The bonding course is made of neat cement and nearly uniform size stone or gravel (preferably 1 inch to $1\frac{1}{2}$ inch in size), in proportion of one part cement to six parts stone or gravel (advertisement, page 441).
- Byerlyte*: Byerley & Sons, 2484 West Fourth Street, Cleveland, Ohio. Several grades of oil asphalt for use in road construction.
- Carbo-Via*: Continental Bitumen Company, Toledo, Ohio. A refined coal tar product.
- Cubanel*: International Asphalt Company, Chamber of Commerce Building, Chicago, Illinois. A fluxed Cuban asphalt for use in paving and road construction.

- Double Bond Cement*: Warren Borthers Company, 59 Temple Place, New York, New York. Trade name given to the asphalt cement used for the bonding course of the Bitustone Double Bond Pavement (advertisement page 441).
- Dustoline*: The Dustoline for Roads Company, Summit, New Jersey.
- Fairfield*: The Impervious Product Company, 400 E. Fayette Street, Baltimore, Maryland. The trade name for the products of this company, such as "Anti-Dust," "Road Binders," and "Fairfield Asphalt." The latter, which forms the basis of their other products, is said to come from a neutralized and weathered sludge acid deposit.
- Glutrin*: Robeson Process Company, Au Sable Forks, New York. An adhesive liquor containing organic acids manufactured from the lignone compounds produced in the making of wood pulp by the sulfite process (advertisement page 431).
- Hassam Pavement*: Hassam Paving Company, Worcester, Massachusetts. A patented form of concrete pavement constructed by grouting the rolled stone with a fluid grout of sand and Portland cement.
- Hydrolene*: The Sun Company, 1421 Chestnut Street, Philadelphia, Pennsylvania. Oil asphalts for use in road construction (advertisement page 436).
- Indian*: Indian Refining Company, 17 Battery Place, New York. The trade name for several grades of reduced and residual petroleum and oil asphalt such as "Indian Liquid Asphalt," "Indian Asphalt Binder," manufactured by this company for use in hot and cold surface treatment and in the construction of roads.
- Kyrock*: Wadsworth Stone and Paving Company, Lambert Street, and P. R. R. Pittsburgh, Pennsylvania. A native rock asphalt.
- Pioneer*: American Asphaltum and Rubber Company, 600-14 Harvester Building, Chicago, Illinois. Several grades of oil asphalt said to contain Gilsonite, for use in road construction (advertisement page 410).
- Prime White Road Oil*: Prime White Road Oil Company, First National Bank Building, Cincinnati, Ohio. A colorless petroleum distillate for use as a dust layer.
- Rocmac*: Rocmac Ltd. Inc., North Tonawanda, New York. A chemical mixture containing silicate of soda, sugar, powdered limestone, and other ingredients with which the upper course in macadam or gravel construction is puddled (advertisement page 436).
- Sarco*: Standard Asphalt and Rubber Company, First National Bank Building, Chicago, Illinois. Several grades of asphalt, said to contain Gilsonite, for use in road construction (advertisement page 434).
- Sarcolithic*: Standard Asphalt and Rubber Company, Suite 505, 137 S. La Salle Street, Chicago, Illinois. The trade name for a form of pavement consisting of a graded crushed stone aggregate which is mixed with Sarco Asphaltic Cement (advertisement page 434).
- Standard*: Standard Oil Company, 26 Broadway, New York, New York. The trade name for several grades of reduced and residual petroleum and oil asphalt such as "Standard Asphalt Road Oil," "Standard Non-Asphaltic Road Oil," "Standard Emulsifying Road Oil," "Standard Paving Asphalt," "Standard Macadam Asphalt Binder," manufactured by this company for use in hot and cold surface treatment and in the construction of roads (advertisement page 433).
- Tarite*: The American Tar Company, Malden, Massachusetts. A refined coal tar product for use in road construction. "Tarite Asphalt" is a refined coal tar containing a certain percentage of oil asphalt. "Tarine", a refined tar preparation for use in construction work or in surface treatments (advertisement page 445).
- Taroid*: The F. J. Lewis Manufacturing Company, 2505 South Robey Street, Chicago, Illinois. A refined coal tar product.

- Tarvia*: Barrett Manufacturing Company, 17 Battery Place, New York, New York. A trade name of this Company for their tar products used for road purposes. "Tarvia A" for hot surface treatment; "Tarvia B" for cold surface treatment; "Tarvia X" for penetration or mixing method in road construction (advertisement page 418).
- Tasscoil*: The Alden Speare's Sons Company, Boston, Massachusetts. A colorless oil distillate for use as a dust layer.
- Terracolio*: Headley Good Roads Company, Real Estate Trust Building, Philadelphia, Pennsylvania. An emulsified semiasphaltic oil which may be diluted and used in the surface treatment of roads (advertisement page 415).
- Texaco*: The Texas Company, 17 Battery Place, New York, New York. The trade name for several grades of fluid reduced petroleum for use in the surface treatment of roads (advertisement page 437).
- Trinidad Liquid Asphalt*: Barber Asphalt Paving Company, Land Title Building, Philadelphia, Pennsylvania. Natural liquid asphalt for the surface treatment of roads, obtained from the Island of Trinidad; "A" to be used cold; "B" to be applied hot (advertisement page 416).
- Ugite*: The United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania. The trade name for fluid and semisolid refined water-gas tar for use in surface treatment and construction. "No. 1" is applied cold as a dust layer; "No. 2" is applied hot for surface treatment; "No. 3" is recommended for construction by the penetration method; "No. 4" is recommended for construction by the mixing method.
- Warrenite*: Warren Brothers Company, 59 Temple Place, Boston Massachusetts. A modification of the bitulithic city pavement adapted to meet the traffic conditions of country roads (advertisement page 441).
- Westrumite*: Westrumite Company of America, Suite 117 Monadnock Block, Chicago, Illinois. A patented emulsion of petroleum and ammonia forming a soap which is soluble in water and is applied as a dust layer.

GENERAL TREATISES ON ROAD AND BRIDGE CONSTRUCTION AND MAINTENANCE⁵⁰

- AGANA, MARCELINO. The value of good roads. From the *Philippine Agricultural Review*, October, 1909. Extract from *Philippine Education*, vol. vi, no. 1, June, 1909.
- AITKEN, THOMAS. Irish Roads Improvement Association. Good roads: How to make and how to maintain them. Efficiency with economy. Belfast, Ireland, 1902. Contains also: Constitution of Irish Roads Improvement Association.
- Road making and maintenance: A practical treatise for engineers, surveyors, and others. With an historical sketch of ancient and modern practice. London, 1907.
- American civil engineers' pocket book. New York, 1911.
- American School of Correspondence, Chicago. Bridge engineering: Roof trusses; a manual of practical instruction in the calculation and design of steel truss and girder bridges for railroads and highways. By FRANK O. DUFOUR. Chicago, 1908.
- American School of Correspondence, Chicago, Illinois. Cyclopedia of civil engineering, vols. 1-8, Chicago, Ill., 1909.
- Appleton's new practical cyclopedia. New York, 1910.
- BAKER, IRA OSBORN. A treatise on roads and pavements. New York, 1905.
- BARNARD, GEO. D. AND COMPANY. Road overseer's commission with road law. St. Louis, Mo., 1893.
- BEEDE, G. F. Country roads. Exeter, N. H., 1904.
- BLACK, A. The laboratory for the testing of road materials at Columbia University, with observations on current practice. Reprint from the *School of Mines Quarterly*, no. 2, vol. xxvi, January, 1905.
- BOORMAN, T. HUGH. Asphalts, their sources and utilizations; asphalt for dustless roads; recent improvements in asphalt industries, together with addenda treating on general water-proof construction. New York, 1908.
- BOULNOIS, H. PERCY. Practical road engineering for the new traffic requirements. Compiled from the Special "Roads" issues of the *Surveyor and Municipal and County Engineer*. London, England, 1910.
- BOWLES, OLIVER. Tables for the determination of common rocks. New York, 1910.
- BYRNE, AUSTIN T., and PHILLIPS, ALFRED E. Highway construction; a practical guide to modern methods of road-building and the development of better ways of communication. Chicago, Ill., 1908.
- CAMPBELL, JOHN T. A road system in statutory form, for creating, constructing, repairing and maintaining public highways.
- CHAMBERLAIN, W. I. Tile drainage; or why, where, when and how to drain land with tiles, a practical book for practical farmers. Medina, Ohio, 1891.

⁵⁰ Only modern works in English, which are easily obtainable, have been given in this list.

- CLEMENS, GASPER CHRISTOPHER. A manual of the law of roads and highways in the State of Kansas. With forms and record entries. Topeka, Kans., 1903.
- COANE, JOHN MONTGOMERY, and others. Australasian roads, a treatise, practical and scientific, on the location, design, construction and maintenance of roads and pavements. Melbourne, 1908.
- CODRINGTON, THOMAS. The maintenance of macadamised roads. London, England, 1892.
- CORNER, CHARLES. County roads. Academy of Science, Texas, 1895.
- DIAMANT, SIDNEY. Curves for calculating beams, channels and reactions. New York, N. Y., 1900.
- DICKINSON, M. F. Rights and duties concerning highways. Lecture delivered at the public winter meeting of the Massachusetts State Board of Agriculture, at North Adams, December 4, 1902. From the fiftieth annual report of the Massachusetts State Board of Agriculture. Boston, 1902.
- DODGE, G. F. Diagrams for designing reinforced concrete structures, including diagrams for reactions and strength of steel beams. New York, N. Y., 1910.
- DUMAZUEL, EDMOND G. F. R. Manual of reinforced concrete construction. New York, N. Y., 1910.
- ELLIOTT, BYRON K. A treatise on the law of roads and streets. Indianapolis, Ind., 1911.
- ELLIOTT, CHARLES GLEASON. Engineering for land drainage. A manual for laying out and constructing drains for the improvement of agricultural lands. New York, 1911.
- Practical farm drainage; a manual for farmer and student. New York, 1908.
- Engineering Record*, The. Road construction and maintenance. Prize essays reprinted from *The Engineering Record*. New York, 1892.
- FOWLER, CHARLES EVAN. Law and business of engineering and contracting with numerous forms and blanks for practical use. New York, N. Y., 1909.
- FROST, HARWOOD. Good engineering literature. What to read and how to write with suggestive information on allied topics. Chicago, Ill., 1911.
- The art of roadmaking, treating of the various problems and operations in the construction and maintenance of roads, streets, and pavements. New York, 1910.
- GILLESPIE, W. M. A manual of the principles and practice of roadmaking; comprising the location, construction and improvement of roads, common, macadam, paved, plank, etc., and rail-roads. New York, 1871.
- GILLETTE, HALBERT POWERS. Handbook of cost data for contractors and engineers. Chicago, 1910.
- The economics of road construction. New York, 1906.
- GILLMORE, QUINCY ADAMS. A practical treatise on roads, streets and pavements. New York, 1890.
- GLADWELL, ARTHUR, and MANNING, GEORGE WILLIAM. Highway maintenance and repair. The "Gladwell" system, as applied to the construction and renewal of road surfaces. Descriptive specification, with an introduction by Colonel R. E. Crompton. London, 1908.
- GODFREY, EDWARD. Structural engineering. Book One. Tables. Pittsburgh, Pa., 1905.
- GREENWELL, ALLAN, and ELSDEN, J. V. Roads: Their construction and maintenance with special reference to road materials. London, 1901.
- HAUPT, LEWIS C. MUHLENBURG. A move for better roads. Essays on road making and maintenance and road laws. Philadelphia, Pa., 1891.
- HENRY, PHILIP W. The future road. The wearing surface. Paris, 1908.

- HERSCHEL, CLEMENS. The science of road making. By CLEMENS HERSCHEL. Construction and maintenance of roads. By EDWARD P. NORTH. New York, 1894.
- HOOLEY, E. PURNELL. Management of highways. London.
- HOPKINS, ALBERT ALLIS. *The Scientific American* cyclopedia of receipts, notes and queries. New York, 1906.
- HOWARD, J. W. Advantages of good pavements and attractive streets. Reprint from *The Engineering Magazine*. New York.
- HUBBARD, PREVOST. Dust preventives and road binders. New York, 1910.
- HULBERT, ARCHER BUTLER. Historic highways of America. 16 vols. Cleveland, Ohio, 1902-05.
Red-men's roads; the Indian thoroughfares of the Central West. Columbus, Ohio, 1900.
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BULLETINS, CIRCULARS AND DOCUMENTS

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ANNUAL REPORTS

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3. Improvement of the road system of Georgia. O. H. Sheffield.
4. Report on road-making materials in Arkansas. J. C. Branner.
5. Information regarding road materials and transportation rates in certain States west of the Mississippi River.

⁵¹ The department supply of a number of these publications is exhausted, but copies may be had by purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 5 cents each except in the case of bulletins, which range from 5 to 30 cents. A revised list of publications of the Office of Public Roads is issued every three months, and copies can be had upon request to that office.

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15. Proceedings of the Good Roads Convention of Texas, held at Turner's Hall, in Houston, Tex., February 19, 1895.
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27. The construction of sand-clay and burnt-clay roads. W. L. Spoon.
28. The decomposition of the feldspars. A. S. Cushman and Prevost Hubbard.
29. The Construction of Macadam Roads. A. B. Fletcher.
30. The Corrosion of Iron. A. S. Cushman.
31. Examination and classification of rocks for roadbuilding, including the physical properties of rocks with reference to their mineral composition and structure. E. C. E. Lord.
32. Public-road mileage, revenues, and expenditures in the United States in 1904. M. O. Eldridge.
33. Road materials of southern and eastern Maine. Prepared in coöperation between the United States Geological Survey, the State Survey Commission of Maine, and the Office of Public Roads. Henry Leighton and E. S. Bastin.

34. Dust preventives. Prevost Hubbard.
35. The preservation of iron and steel. A. S. Cushman.
36. Descriptive catalogue of the road model exhibit of the Office of Public Roads, Alaska-Yukon-Pacific Exposition. Prepared by the Office of Public Roads.
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38. Methods for the examination of bituminous road materials. Prevost Hubbard and Charles S. Reeve.
39. Highway bridges and culverts. Charles H. Hoyt and William H. Burr.
40. The road material resources of Minnesota. George W. Cooley.
41. Mileage and cost of public roads in the United States in 1909. J. E. Pennybacker, Jr. and Maurice O. Eldridge.
42. New Hampshire highways. Report of an inspection of highways in the State of New Hampshire, August, 1911. Charles H. Hoyt.
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14. Addresses on road improvement. Roy Stone.
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16. Highway Taxation: Comparative results of labor and money systems.
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19. Traffic of the country roads.
20. Comments on systems of maintaining country roads.
21. Methods of constructing macadamized roads. Extract from a report prepared by the chief engineering inspector of the Local Government Board. (England.)
22. Appeal for organization of State and local road-improvement societies. C. A. Locke.
23. Money value of good roads to farmers. W. C. Latta.
24. Highway maintenance and repairs. Revision of Circulars 16, 20, and 24.
25. Brick paving for country roads.
26. Going in debt for good roads.
27. Cost of hauling farm products to market or to shipping points in European countries.
28. Addresses on road improvement in Maine, New York, North Carolina, and Illinois. Roy Stone.
29. The forces which operate to destroy roads, with notes on road stones and problems therewith connected. C. L. Whittle.
30. Repairs on macadam roads. E. G. Harrison.
31. Must the farmer pay for good roads? Otto Dorner.
32. State aid to road building in Minnesota. A. B. Choate.
33. Road improvement in governors' messages. Compiled by Roy Stone.
34. The social, commercial, and economic phases of the road subject. W. H. Moore.
35. Road improvement in New York.
36. List of national, State, and local road associations and kindred organizations in the United States.
37. The railroads and the wagon roads. A. L. Craig.

⁵² Circulars 1 to 13 were of temporary character and are no longer in print.

38. A study of rock decomposition under the action of water. A. S. Cushman.
- 39 to 46 inclusive. Public roads of Washington, Arizona, Arkansas, Oregon, Iowa, Virginia, North Carolina, and Alabama: Mileage and expenditures in 1904. M. O. Eldridge.
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88. Publications of the Office of Public Roads. Revised June, 1909. Compiled by A. E. Draper. (Out of date.)
89. Progress reports of experiments with dust preventives.
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91. Sand-clay and earth roads in the Middle West. W. L. Spoon.
92. Progress reports of experiments in dust prevention and road preservation.
93. Bitumens and their essential constituents for road construction and maintenance. Prevost Hubbard.
94. Progress reports of experiments in dust prevention and road preservation, 1910. Prepared by the Office of Public Roads.
95. Special road problems in the southern States. D. H. Winslow.
96. Naphthalene in road tars. I. The effect of naphthalene upon the consistency of refined tars. Prevost Hubbard and Clifton N. Draper.
97. Coke-oven tars of the United States. Prevost Hubbard.

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95. Good roads for farmers. M. O. Eldridge.
136. Earth roads. M. O. Eldridge.
235. Cement mortar and concrete: preparation and use for farm purposes. P. L. Wormeley.
239. The corrosin of fence wire. A. S. Cushman.
311. Sand-clay and burnt-clay roads. W. L. Spoon.
321. The use of the split-log drag on earth roads. D. W. King.
338. Macadam roads. A. B. Fletcher.
403. The construction of concrete fence posts. Prepared by the Office of Public roads.
461. The use of concrete on the farm. Prepared by the Office of Public Roads.

YEARBOOK ARTICLES

(Extracts from the Yearbooks of the Department of Agriculture)

Yearbook of the Department of Agriculture, 1894

24. Best roads for farms and farming districts. Roy Stone.
25. State highways in Massachusetts. G. A. Perkins.
26. Improvement of public roads in North Carolina. J. A. Holmes.

Yearbook of the Department of Agriculture, 1895

40. Coöperative road construction. Roy Stone.

Yearbook of the Department of Agriculture, 1897

118. Object-lesson Roads. Roy Stone.

Yearbook of the Department of Agriculture, 1898

149. Steel-track wagon roads. Martin Dodge.
150. Construction of good country roads. M. O. Eldridge.

Yearbook of the Department of Agriculture, 1899

172. Progress of road building in the United States. M. O. Eldridge.

Yearbook of the Department of Agriculture, 1900

204. The selection of materials for macadam roads. L. W. Page.
210. Mountain Roads. J. W. Abbott.

Yearbook of the Department of Agriculture, 1901

240. Road building with convict labor in the southern States. J. A. Holmes.
245. Government coöperation in object-lesson road work. Martin Dodge.
253. Mountain roads as a source of revenue. J. W. Abbott.

Yearbook of the Department of Agriculture, 1902

296. Use of mineral oil in road improvement. J. W. Abbott.

Yearbook of the Department of Agriculture, 1903

305. Progress of road building in the Middle West. R. W. Richardson.
332. Building Sand-clay roads in southern States. W. L. Spoon.

Yearbook of the Department of Agriculture, 1904

350. Practical road building in Madison County, Tennessee. S. C. Lancaster.

Yearbook of the Department of Agriculture, 1905

407. Progress of road legislation and road improvement in the different States. Prepared in the Office of Public Roads.

Yearbook of the Department of Agriculture, 1906

412. Object-lesson roads. L. W. Page.

Yearbook of the Department of Agriculture, 1907

448. Dust preventives. L. W. Page.

Yearbook of the Department of Agriculture, 1909

513. Information in regard to fabricated wire fences and hints to purchasers. Allerton S. Cushman.

Yearbook of the Department of Agriculture, 1910

535. Progress and present status of the good roads movement in the United States. Logan Waller Page.
538. Bituminous dust preventives and road binders. Prevost Hubbard.

LECTURE SYLLABUS

Syllabus of Illustrated lecture on roads and road building. Office of Experiment Stations, Farmers' Institute Lecture 7. Office of Public Roads.

Publications of the Bureau of Chemistry on Road Materials

The following publications were issued by the Bureau of Chemistry when the Office of Public Roads formed a part of that Bureau.

BULLETINS

- 79. The testing of road materials, including the methods used and the results obtained in the road material laboratory in collaboration with the Office of Public Road Inquiries. L. W. Page and A. S. Cushman.
- 85. The cementing power of road materials. L. W. Page and A. S. Cushman.
- 92. The effect of water on rock powders. A. S. Cushman.

CIRCULAR

- 17. The useful properties of clays. A. S. Cushman.

Alabama

State Highway Department

- Bulletin 1. State highway laws of Alabama in effect April 5, 1911.
- Bulletin 2. Roads and road materials of Alabama. W. F. Prouty.

California

Report Surveyor General, 1854

Comments on California and Missouri mail stage road, and Atlantic and Pacific Railroad; also recommendation for appropriation for locating and constructing portion of proposed California and Missouri stage road lying between some point in great central valley of State, and its eastern boundary.

State Convention of Supervisors, San José, 1896.

Road sprinkling. Paper read before State Convention of County Supervisors at San José, by M. Manson. 1896.

Commissioner of Public Works

Reports, 1894 to 1904.

Department of Highways

Biennial Reports, 1895-96 to 1905-06.

Bulletin 1. An act to create a bureau of highways and prescribe its duties and powers and to make an appropriation for its expenses (1895).

Bulletin 2. An act providing for the erection and operation of rock crushing plants at the State prisons for the preparation of highway material for the benefit of the people of the State, and providing for the necessary advances and appropriation of money to carry out said work (1895).

Bulletin 3. Physical features of the State.

Bulletin 4. The effect of roads on industrial development.

Bulletin 5. Proposed highway legislation with comments and resolutions thereon.

State Engineer

Reports from 1878-79 to 1908-10.

State Mineralogist

Reports, twelfth, 1892-94; thirteenth, 1894-96.
(Macadam in Alameda, Los Angeles, Marin, San Francisco, Solano, and Sonoma Counties.)

Colorado

State Highway Commission

Biennial Report, January to November, 1910.
Bulletin 1. Act establishing highway commission, 1910.
Bulletin 2. Act establishing highway commission, 1911, and road laws of Colorado.

Connecticut

State Highway Commissioner

Annual Reports, 1895 to 1900, inclusive.
Biennial Reports, 1901-02 to 1909-10, inclusive.

Delaware

Delaware State Highway Commission.

Biennial Report, first, 1903-04.

New Castle County State Highway Commission.

Biennial Reports, first to third, 1905-06 to 1909-10.

District of Columbia

Engineer Department

Annual Reports.
Report of the Operations of the Engineer Department, 1899-1900 to 1910-11.
Annual Report on the streets and roads, 1879-80, 1881-82.

Florida

State Geological Survey

Bulletin 2. Roads and road materials in Florida. E. H. Sellards, et al.

Georgia

Geological Survey

Bulletin 8. A preliminary report on roads and road building materials of Georgia (1901). S. W. McCallie.
Bulletin 24. A second report on the public roads of Georgia (1910). S. W. McCallie. (First report, Bulletin 8.)

Georgia University. State College of Agriculture.

Bulletin, vol. 9, no. 5. Good roads for Georgia.

State Prison Commission.

Annual Reports, thirteenth to fourteenth, 1909-10 to 1910-11.

Idaho

Agricultural Experiment Station

Bulletin 45, 1904. Road construction.

Bulletin 50, 1905. Road construction.

State Engineer

Biennial Reports, third, 1899 to 1900; sixth 1904 to 1906; eighth 1908 to 1910.

Illinois**Agricultural Experiment Station**

Bulletin 65, 1901. Road construction and maintenance.

Highway Commission

Annual Reports from 1906.

Bulletin 1. Earth road drag, how to make it and how to use it.

Bulletin 2. Road drag law and rules for dragging.

Bulletin 3. How to secure bridge plans. Information for county, township, and municipal officers.

Bulletin 4. Crushed Stone prepared by convict labor and rules for its use.

Bulletin 6. Modern bridges for Illinois highways.

State Geological Survey.

Bulletin 9. Paving brick and paving brick clays of Illinois (1908).

Illinois University. Engineering Experiment Station.

Bulletin 65. Construction and care of earth roads. Ira O. Baker.

Indiana**State Geological Survey.**

30th Annual Report, 1905. Roads and road materials of Indiana. W. S. Blatchley and Assistant.

Iowa**State Highway Commission**

Annual Reports from 1904-05.

Manual for Iowa highway officers, 1905-06.

Bulletin, vol. 3, no. 1. Road and bridge improvement in Iowa, 1908.

Iowa State College. Engineering Experiment Station

Bulletin, vol. 2, no. 6. The good roads problem in Iowa. Iowa State Highway Commission.

Kansas**Agricultural Experiment Station**

Bulletin 142, 1907. Road improvement.

State Agricultural College

Bulletin, vol. 3, no. 6. Highway improvement: construction and maintenance of earth, sand-clay, and oiled earth roads, and culverts. W. S. Gearhart.

Kentucky**Governor's Message, 1827**

State control of roads and bridges urged.

State Board of Internal Improvement

Annual report, 1837. Directions for construction of turnpike roads.

Governor's Message, 1838-39

Review of history of internal improvement of the past. A large number of reports and bulletins were issued by the State Board of Internal Improvement and the Legislature regarding toll roads.

State Auditor

Biennial report, 1881-83. Statement showing number of turnpikes in which State owns stock, length of each in miles, whole number of shares of stock, number owned by State, amount per share, average per cent stock has paid for six years prior to January 1, 1882; amount of dividends paid State, cost for salaries to gate keepers and officers, and cost of repairs. 1882-1885.

State Geological Survey

Report of progress, 1886-87. Historic sketch of turnpike road and railroad building in Kentucky. 1775-1820.

Bureau of Agriculture, Horticulture and Statistics

Annual report, eighth, part 2, 1889. Conditions of public highways in Kentucky, 1889.

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State Farmers' Institutes

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Second, 1907. Dirt roads, their construction and maintenance.

Third, 1908. County roads.

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Louisiana**State Engineer**

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Board of State Engineers

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Agricultural Experiment Station

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Maine**Commissioner of highways**

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Maryland**State Geological Survey**

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The new State aid law. How roads may be secured under its provisions, 1904.

Summary: Final report on the work of the highway commission of the Maryland Geological Survey, 1898-1910, accompanied by the fourth and final report on State highway construction.

Massachusetts

State Highway Commission

Annual report 1892. Economics of Massachusetts roads.

Table showing mileage of pavements. Road machinery and cost of same. Article on road materials of Massachusetts regarding construction of highways. Statistics showing area, roads, valuations, appropriations, and population with percentages regarding tax and valuation.

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House document 253, 1880. Report on subject of "broad rimmed wheels."

Michigan

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Bulletin 2. Gravel roads, 1911. F. F. Rogers.

Bulletin 3. The county road system. F. G. Randall. 1911.

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Minnesota

State Highway Commission

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Bulletin 2. Rules and regulations of State highway department of Minnesota.

Bulletin 3.

Bulletin 4. Better roads for Minnesota. Address by Hon. Logan Waller Page.

Bulletin 5. Additional rules and regulations for the construction and improvement of State roads.

Bulletin 6. Report of the State highway engineer on highway systems of foreign countries.

Bulletin 7. Additional rules and regulations for the construction of State roads and bridges.

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Circular 3. Partial digest of the laws pertaining to the highway commission and expenditures of the State aid funds.

Mississippi

Mississippi Agriculture Experiment Station

Bulletin 67, 1901. Good dirt roads for Mississippi.

Department of Agriculture and Commerce

Bulletin, vol. 2, no. 3. Road construction and maintenance.

Missouri

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Volume 6, no. 5 (Bulletin 3). Earth roads.

Volume 6, no. 7 (Bulletin 4). Contracts.

Volume 6, no. 8 (Bulletin 5). Bridges and culverts.

Volume 6, no. 9 (Bulletin 6). Roads bad and good.

Volume 6, no. 12a (Bulletin 7). Earth roads revised.

Volume 7, no. 1 (Bulletin 8). Second annual meeting Engineers Highway Association.

Volume 7, no. 6 (Bulletin 9). Rock and gravel roads.

Volume 8, no. 6 (Bulletin 10). Third annual meeting Highway Engineers Association of Missouri.

Volume 9, no. 4 (Bulletin 11). Fourth annual meeting Highway Engineers Association. 1911.

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Missouri University. College of Agriculture and Mechanic Arts

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Montana

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Nebraska

State University. Agricultural Experiment Station

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L. W. Chase.

Nevada

State Engineer

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New Hampshire

State Engineer

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Agricultural Experiment Station

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State Board of Agriculture

Making and repairing roads. M. Humphrey, 1872.

Annual report, 1894-96. Proceedings of first good roads convention.

State Bureau of Labor

Biennial report, fourth, 1901-02. New Hampshire highway statistics with tables showing by town and county, taxes assessed for all purposes, amount expended on highways, amount expended for repairing of highways in summer, amount expended in breaking roads in winter, number of miles of highway, daily wages, etc.

New Jersey

Commissioner of Public Roads

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Agricultural Experiment Station

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New Mexico

Territorial Engineer

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New York

State Department of Highways

Proceedings of the first to third semi-annual conference of the State commission and county superintendents of highways of the State of New York, 1909-10.

State Department of Highways. Bureau of Research

Annual Report, 1909-10. Two volumes.

State Commission of Highways

Reports, 1909, 1910, 1911.

State Commission of Highways. Bureau of Town Highways

Bulletin 1. Practical suggestions and directions to highway officials relating to construction and improvement, repair and maintenance of town highways and bridges. F. D. Lyon.

State Engineer and Surveyor

Annual report, 1899. History of road improvements during year; arranged by roads.

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Annual Report, 1901-02. Suggestions regarding improvement of various State highways funded by means of issuing State bonds bearing interest and to be redeemed in course of seventeen years from issue.

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Bulletin 7. Improvement, repair and maintenance of public highways (1904).

Bulletin 8. Comparison of progress during period in which the State aid law has been in operation in New York State (1905).

Bulletin 9. Proceedings of the sixth annual good roads convention of the board of supervisors of the State of New York (1905).

Bulletin 10. Road Red Book (1905).

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State Agriculture Society

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State Museum

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North Dakota**State Agricultural Experiment Station**

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Ohio**State Highway Department**

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Bulletin 3. Maintenance of country roads. Sam Houston.

Bulletin 4. State supervision and State aid. Sam Houston.

Bulletin 5. Convict labor for road improvement. Sam Houston.

Bulletin 6. Condition and cost of country roads in Ohio.

Bulletin 7. Revised instructions and forms. Sam Houston.

Bulletin 8. Road laws of Ohio.

Bulletin 9. Proposed amended State aid law. Sam Houston.

Bulletin 10. The use of wide tires.

Bulletin 11. Highway maps of the counties of Ohio.

Bulletin 12. Report of experiments to determine the comparative values of various road-binding materials.

Bulletin 13. Supplemental report on Nelson Avenue experimental road.

Bulletin 14. An act creating the State highway department and providing aid in construction and maintenance of highways.

State Board of Public Works

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- State Geological Survey
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 - Bulletin 66. Pennsylvania road statistics by townships. John Hamilton.
 - Bulletin 69. The road making materials of Pennsylvania. M. C. Ihlsing.
 - Bulletin 121. Address of Hon. J. W. Hunter, State highway commissioner.

Rhode Island

- State Commissioner of Highways
 - Annual reports, 1895-96, to 1896-97.
- State Board of Public Roads
 - Annual reports from 1902.
- State Board of Agriculture
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South Carolina

- State Superintendent of Public Works
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- State Agricultural Experiment Station. Clemson Agricultural College
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University of South Carolina

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South Dakota**State Engineer**

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Tennessee**State Highway Commission**

Special message of Governor Malcolm R. Patterson to the 57th General Assembly, January, 1911.

State Agricultural Experiment Station

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Texas**State University—Mineral Survey**

Bulletins, 1901 to 1904. Nine volumes. 1. Texas petroleum, 1901.
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Utah**State Road Commission**

Biennial report, 1909-10.

State University. State School of Mines

Bulletin 2. Tests of macadam roads. E. H. Beckstrand.

State Engineer

Biennial reports, fourth to seventh; 1903-04 to 1909-10.

Vermont**State Highway Commission**

Reports, first to sixth; 1899-1900 to 1909-10.

State Board of Agriculture.

Biennial Report, second, 1873-74. Highways. A. B. Halbert.

State Legislature—Senate

Journal 1855. Report of committee on roads.

Virginia**State Agricultural Experiment Station**

Bulletin 34, 1893. Road improvement.

State Highway Commissioner

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State Board of Public Works

Reports, 1816, 1818, 1819-20, 1823 to 1847, 1849 to 1855, 1866 to 1876.

Washington**State Highway Department**

Bulletin 1. State and county road laws by legislature of 1907.

Bulletin 2. Report to Governor of Washington on convict labor on State roads.

Bulletin 3. State aid roads.

State investigating committee, highway department. Report of the board of control on State rock crushing plants; working convicts on State roads and at crushing plants.

- State Agricultural Experiment Station
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 State Geological Survey
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West Virginia

- State Highway Inspector
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 State Department of Public Roads
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 Bulletin 1. Road drags, their construction and use. H. E. Williamson.
 Bulletin 2. To the county road engineers.
 Bulletin 3. Opinion of the attorney general in regard to the road and bridge funds of West Virginia.

Wisconsin

- State Geological and Natural History Survey
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 Road Pamphlet 5. First biennial report of the Highway Division.
 State Agricultural Experiment Station
 Report for 1902. Road construction in Wisconsin.
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 State Highway Commission
 Bulletin 1. The new State and highway law, chapter 337, Laws 1911.

Wyoming

- State Engineer
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ASSOCIATIONS

Permanent International Association of Road Congresses

Officer.—M. Mahieu, secretary-general, 1 Avenue d'Iena, Paris, France.

1. OBJECT AND ORGANIZATION OF THE ASSOCIATION

ARTICLE I

The object of the Permanent International Association of Road Congresses is to promote progress in the construction, traffic and exploitation of roads.

It continues the work of the first International Road Congress held in Paris in October, 1908.

It accomplishes its object: 1, By organizing Road Congresses; 2, by publishing papers, proceedings, and other documents; 3, by collecting the results of (*a*) tests carried out on roads; (*b*) laboratory tests throughout the world on materials which are used or are suitable for road construction and maintenance; these tests may be either in the form of mere records collected by the Association or they may have been carried out by the Association itself or through its instrumentality.

Its affairs are managed by a Permanent International Commission.

ARTICLE II

The Association consists of:

1. Delegates of Governments and Corporations of all the countries which subscribe annually to the Association.

2. Private Members.

Membership may be either permanent or temporary.

Governments may appoint one official delegate, with a right to vote at every Congress, for each 250 francs of their annual subsidy.

This amount is reduced to 100 francs for Corporations.

Permanent Members are entitled to attend and vote at every Congress.

Temporary members are entitled to attend the particular Congress they have joined, and they may vote on all questions which do not affect the Permanent Association itself.

3. Honorary Members, nominated by the Permanent International Commission.

ARTICLE III

1. A Permanent International Commission, with headquarters at Paris, is at the head of the Association.

2. A Permanent Council and an Executive Committee are appointed from amongst the Members of this Commission.

ARTICLE IV

The Permanent International Commission is composed of members belonging to the various countries represented in the Association. Each country has the right to one representative for each 1000 francs of its total annual subsidy.

Provided, however, that the number of representatives from any one country shall not exceed 15 (fifteen), and that any country which pays not less than 250 francs shall have the right to appoint one delegate.⁵³

American Road Builders' Association

Officers.—Nelson P. Lewis, president, New York; Harold Parker, first vice-president, Worcester, Massachusetts; J. D. Meriwether, second vice-president, Socorro, New Mexico; W. A. McLean, third vice-president, Toronto, Ontario; E. L. Powers, secretary, New York; W. W. Crosby, treasurer, Baltimore, Maryland.

Headquarters.—No. 150 Nassau Street, New York City.

Objects.—To acquire and disseminate information concerning the best practice in highway construction and maintenance.

To raise the standards of construction.

To emphasize the necessity of careful attention to all details, both of construction and maintenance, and to the selection of such materials as will produce the best results for the amount of money available in each particular case.

To study and compare the organization and the methods of administration, pointing out their relative efficiency in order to secure the best results.

To promote more intelligent interest in and a keener appreciation of the importance of highway construction on the part of administrative officers, engineers and contractors.

⁵³ For further information address either the secretary general or the American Association for Highway Improvement.

To emphasize the necessity of planning an efficient system of highways, as well as the intelligent construction of the individual highway.

American Automobile Association

Officers.—Robert P. Hooper, president; A. G. Batchelder, chairman executive committee; Jno. N. Brooks, secretary; Geo. C. Diehl, chairman good roads board, 575 Ellicott Square, Buffalo, New York.

Headquarters.—437 Fifth Avenue, New York.

Objects.—To aid in proper enforcement of automobile laws and ordinances; to advocate and obtain local, State, and federal aid in the construction and maintenance of good roads.

American Society of Civil Engineers

Officers.—John A. Ockerson, president; Charles Warren Hunt, secretary.

Headquarters.—220 West 57th Street, New York.

Purposes Relating to Roads.—Investigation and discussion of technical problems of road construction and maintenance.

American Society for Testing Materials.

Officers.—Robert W. Hunt, president, 1121 The Rookery, Chicago, Illinois; Edgar Marburg, secretary-treasurer, University of Pennsylvania, Philadelphia, Pennsylvania.

Committees.—On Standard Specifications for Cement: George F. Swain, chairman, Harvard University, Cambridge, Massachusetts; Richard L. Humphrey, secretary, 805 Harrison Building, Philadelphia, Pennsylvania.

On Standard Specifications for Paving and Building Brick: A. V. Bleininger, chairman, 910 West Nevada Street, Urbana, Illinois; E. W. Lazell, secretary, 3113 West Ninth Street, Wilmington, Delaware.

On Standard Specifications and Tests for Clay and Cement Sewer Pipe: Rudolph Hering, chairman, 170 Broadway, New York; E. J. Fort, secretary, 215 Montague Street, Brooklyn, New York.

On Standard Tests and Specifications for Drain Tile: A. Marston, chairman, Iowa State College, Ames, Iowa.

On Standard Tests for Road Materials: Logan Waller Page, chairman, Office of Public Roads, Washington, D. C.; Prevost Hubbard, secretary, Institute of Industrial Research, Washington, D. C.

National Grange

Officers.—Oliver Wilson, master, Peoria, Illinois; N. P. Hull, lecturer, Dimondale, Michigan; C. M. Freeman, secretary, Tippecanoe City, Ohio. F. N. Godfrey, chairman executive committee, Olean, New York.

Purposes.—The Grange is actively interested in the movement for better roads, particularly the movement for State and national legislation on the subject.

Farmers' Educational and Coöperative Union of America

Officers.—Charles S. Barret, president, Union City, Georgia; J. E. Montgomery, vice-president, Gleason, Tennessee; R. H. McCulloch, secretary-treasurer, organizer, Texarkana, Texas.

Board of Directors.—W. A. Morris, chairman, Sulligent, Alabama; A. C. Shuford, secretary, Newton, North Carolina; S. L. Wilson, Van Vleet, Mississippi; O. F. Dornblaster, Cleburne, Texas; John Grady, Gilbertsville, Kentucky.

Purposes.—While the Farmers' Union is not primarily a road organization it gives effective support to the road movement.

National Association of Rural Letter Carriers

Good Roads Committee.—D. W. Edie, chairman, Gaysville, Vermont.

Purposes.—The Association is giving effective aid to the movement for better roads through its good roads committee.

National Congress of Mothers

Officers.—Mrs. Frederick Schoff, president, 3418 Baring Street, Philadelphia, Pennsylvania; Mrs. Frank De Garmo, chairman Rural Child Welfare and Good Roads, 5900 Clemens Avenue, St. Louis, Missouri.

Purposes.—Rural Child Welfare and Good Roads Department. The good roads and rural child welfare department was formed at the request of the rural members of the congress who found it impossible to send their children to school on account of the bad condition of the roads.

The work of this department is principally in rural districts. It coöperates with the local good roads organizations in securing good roads to the school houses and promotes in other ways the welfare of the home and of children in rural districts.

National Highways Association

Officers.—Mr. Chas. Henry Davis, president, South Yarmouth, Massachusetts.

Purposes.—To bring about the building of a system of national highways.

National Highways Protective Society

Officers.—Henry Clews, president; Edward S. Cornell, secretary; George W. Burleigh, treasurer.

Headquarters.—46 East 29th Street, New York.

Objects.—To prevent the improper and unreasonable use of the public highways and public roads and places by the owners and users of horses, carriages, bicycles, automobiles, and all other vehicles; to enforce and protect the rights of the members of this corporation and the public in the reasonable and proper use of such public highways, public roads and places, endeavor to secure the construction and maintenance of good roads by public authority; and in furtherance and not in way of limitation upon the objects above enumerated, to endeavor to bring about reasonable and uniform rules and regulations for the use of the public highways, roads and places throughout the United States of America; to aid in the enforcement of the laws in respect thereto, and so far as may be lawful to aid in securing any such changes or modifications thereof as may be found necessary or proper.

Southern Commercial Congress

Officers.—Duncan U. Fletcher, president; William H. Saunders, resident director; G. Grosvenor Dawe, managing director; Clarence J. Owens, secretary-treasurer.

Headquarters.—Southern Building, Washington, D. C.

Purposes.—Relating to Road improvement. To encourage the movement for the construction of good roads and for the extension of railroad and trolley transportation.

Southern Appalachian Good Roads Association

Officers.—Joseph Hyde Pratt, president; State geologist of North Carolina; vice-presidents: Cyrus Kehr, Knoxville, Tennessee; Joseph F. Bosworth, Middlesboro, Kentucky; J. Thompson Brown, Bedford City, Virginia; C. E. Krebs, Charleston, West Virginia; Prof. C. M. Strahan, Athens, Georgia; F. H. Hyatt, Columbia, South Carolina; E. C. Chambers, Asheville, North Carolina; H. B. Varner, Lexington, North Carolina, secretary; executive committee: S. W. McCallie, Atlanta, Georgia, chairman.

Headquarters.—Chapel Hill, North Carolina.

Purpose.—To encourage the building and maintenance of good roads in the Southern Appalachian States.

The Capital Highway Association

Officers.—Leonard Tufts, president, Pinehurst, North Carolina; Allen Potts, vice-president, Richmond, Virginia; Geo. W. Watts, vice-president, Durham, North Carolina; Dr. E. M. Whaley, vice-president, Columbia, South Carolina; W. E. Bush, vice-president, Augusta, Georgia; Edwin W. Robertson, treasurer, Columbia, South Carolina.

Purposes.—The object of the Association is to interest the people to build a road from Washington, D. C., to Atlanta, Georgia, via Petersburg, Emporia, Roanoke Rapids, Littleton, Henderson. At Henderson the Association has decided to make two routes; one via Franklinton and the other via Oxford and Durham to Raleigh. From there it is their intention to interest the people to build it via Sanford, Southern Pines, Pinehurst, Jackson Springs, Rockingham, Cheraw, Darlington, Hattsville, Bishopville, Camden, Columbia, Augusta and Atlanta. This road is approximately 700 miles long. Of this they have interested the people to build approximately 400 miles.

Quebec-Miami International Highway Association

Officers.—Howard D. Hadley, president, Plattsburgh, New York; George A. Simard, vice-president, care Franco-American Chemical Company, Montreal, P. Q.; N. M. Parrott, secretary, 763 Calvert Building, Baltimore, Md.

Board of directors are as follows: George A. Simard, Montreal, representing Quebec; Howard D. Hadley, Plattsburgh, representing New York State; Isaac Simonin, Germantown, representing Pennsylvania; Fred F. Smith, Bridgeton, representing New Jersey; Gen. T. Coleman du Pont, Wilmington, representing Delaware; Charles H. Dickey, Baltimore, representing Maryland; Leslie T. McCleary, Willard Hotel, Washington, representing District of Columbia; Preston Belvin, Sr., Richmond, representing Virginia; Col. Bennehan Cameron, Stagville, representing North Carolina; E. J. Watson, Columbia, representing South Carolina; Joseph F. Gray, Savannah, representing Georgia; E. B. Douglass, Miami, representing Florida.

Headquarters.—Plattsburgh, New York (president's office); 763 Calvert Building, Baltimore, Maryland (secretary's office).

Purposes.—To bring about the building of a fine modern highway between Quebec, Canada and Miami, Florida, U. S. A.

To strive for wise, equitable and uniform road legislation in the States through which the "International Highway" is to run.

To advocate the correlation of all road construction so that the important roads of each Province, State and county shall connect with those adjoining, and the important roads of each nation may connect with those of adjoining nations.

To strive for the utilization of convict labor on highways, where that course is consistent with local policy, so as to involve the least possible competition with free labor, the utmost public benefit and a healthy moral and physical development of the convict.

To promote intercourse, peace, trade and friendly relations between Canada and the United States.

Lincoln Memorial Road Association of America

Officers.—James T. McCleary, president, 30 Church Street, New York; Robert A. C. Smith, treasurer, 100 Broadway, New York; Charles J. Glidden, secretary, Boston, Massachusetts; Leslie T. McCleary, executive secretary, 1411 Pennsylvania Avenue, Washington, D. C.

Object.—To bring about the construction by the United States Government of a great highway between Washington and Gettysburg as the national memorial to Abraham Lincoln. As planned this highway would be in fact a great parkway boulevard, 72 miles in length with appropriate terminal structures, extending from some suitable point in Washington to the spot at Gettysburg where Lincoln delivered his great address.

The New Santa Fe Trail

Officers.—R. H. Faxon, president, editor *The Evening Telegram*, president Kansas Development Association, chairman Kansas State conservation commission, Garden City, Kansas; J. R. Moorehead, vice-president Missouri Grand Division, Lexington, Missouri; O. M. Wilhite, vice-president Eastern Kansas Grand Division, Emporia, Kansas; E. E. Frizell, vice-president Western Kansas Grand Division, Mayor, Larned, Kansas; R. H. Higgins, vice-president Colorado Grand Division, Pueblo, Colorado; R. E. Twitchell, vice-president New Mexico Grand Division, East Las Vegas, New Mexico; C. H. Scott, secretary-treasurer, Hutchinson, Kansas.

Headquarters.—Office *The Evening Telegram*, Garden City, Kansas; office *The Daily News*, Hutchinson, Kansas.

Purposes.—To promote the cause of good roads.

To construct and maintain an interstate highway.

To preserve the history, tradition, and romance of the Old Santa Fé Trail, the first highway of commerce and pioneering in the West.

To bring about wise and useful State roads legislation, as the organization has already done in the State of Kansas.

To project the gospel of, first, federal establishment of transcontinental highways; second, to bring about federal aid, in conjunction and coöperation with the several States.

To bring about definite State supervision of roads; the amendment of State constitutions which at present forbid "work of internal improvement," this organization believing and holding that roadmaking and road supervision are a State function; and to promote as an economical and sociological phase the utilization of convict labor; and to promote the doctrine that the cause of good roads presents the greatest economic, industrial, and social question in the country today.

Omaha-Denver Good Road Association

Officers.—J. E. Davis, president, Sutton, Nebraska; W. A. Taylor, treasurer, Hastings, Nebraska; Geo. E. Parisoe, secretary, Minden, Nebraska; Dr. J. M. Prime, chairman executive committee, Oxford, Nebraska.

Inter-Mountain Good Roads Association

Officers.—E. R. Sherman, president, Buhl, Idaho; Wm. Wallin, secretary, Pocatello, Idaho.

The Travelers Protective Association of America

Officers.—E. B. Smith, national chairman good roads and public utilities committee, Shreveport, Louisiana.

State and Local Organizations

Alabama

- Alabama Good Roads Association, John Craft, president, Mobile.
- Huntsville Boulevard Club and National Highway, Ben P. Hunt, president, Huntsville.
- Baldwin County Good Roads Association, Bay Minette.
- Blount County Good Roads Association, Oneonta.
- Calhoun County Good Roads Association, W. T. Goodlett, secretary, Jacksonville.
- Cherokee County Good Roads Association, Center.
- Clarke County Good Roads Association, Grove Hill.
- Coffee County Good Roads Association, F. A. Symonds, president, Elba.
- Crenshaw County Good Roads Association, Dr. J. R. Horn, president, Luverne.
- Dale County Good Roads Association, L. F. Sessions, president, Ozark.
- Dallas County Good Roads Association, Clifton Kirkpatrick, president, Cahaba.

Elmore County Good Roads Association, H. H. Golson, secretary, Wetumpka.
Etowah County Good Roads Association, W. P. Archer, president, J. L. Irving, secretary, Gadsden.
Franklin County Good Roads Association, J. Gassier, president, J. C. Norwood, secretary, Russellville.
Houston County Good Roads Association, W. R. Flowers, president, Dothan.
Henry County Good Roads Association, J. R. Ward, president, Abbeville.
Jefferson County Good Roads Association, John W. O'Neill, president, J. A. Rountree, secretary-treasurer, Birmingham.
Pike County Good Roads Association, M. D. Pace, president, Trop.
St. Claire County Good Roads Association, W. S. Forman, president, Ashville, E. E. Kersh, secretary, Odenville.
Talladega County Good Roads Association, A. L. McElderry, president, Talladega.

Arizona

Arizona Good Roads Association, T. G. Norris, president, Prescott.

Arkansas

Arkansas Good Roads and Drainage Association, Joseph Asher, president, Little Rock.
Sharp County Good Roads Association, Thomas J. Wood, president, Evening Shade.
Washington County Good Roads Association, C. E. Pritchard, president, Fayetteville.

California

Contra Costa County Good Roads League, Warren H. McBryde, president, Pinole, W. C. Stewart, secretary, Danville.

Colorado

Arkansas, Rio Grande, Gunnison and Grand River Highway Ass'n., C. R. McLain, president, Canon City.
Central Colorado Highway Association, L. M. Curtis, president, Colorado Springs.
Colorado Good Roads Convention, R. Higgins, president, Pueblo.
Greater Colorado Highway Association, E. E. Sommers, president, Denver.
Lincoln Highway Association of Colorado, Leonard E. Curtis, president, Colorado Springs.
Rocky Mountain Highway Association, Denver.
Arapahoe County Good Roads Association, Littleton.
El Paso County Good Roads Association, Colorado Springs.
Fremont County Good Roads Association, Canon City.
Jefferson County Good Roads Association, Golden.
La Plata County Good Roads Association, Chamber of Commerce, Durango.
Las Animas County Good Roads Association, Trinidad.
Park County Good Roads Association, Fair Play.
Pitkin County Good Roads League, Aspen.
Powers County Good Roads Association, Holly.
Rio Blanco County Good Roads Association, Meeker.
San Juan County Good Roads Association, Chamber of Commerce, Silverton.
Weld County Good Roads Association, Ault.

Connecticut

Redding Protective League, Charles H. Plump, secretary, Redding.
 Waterbury Good Roads Association, Inc., George Tracy, president, H. B. Reynolds, secretary, Waterbury.

Florida

State Good Roads Association, William Stinson, president, Jacksonville.
 A. B. Dunning, secretary, DeLand; J. W. White, treasurer, Jacksonville.
 Alachua County Good Roads Association, H. L. Montgomery, president, Miconopy.
 Baker County Good Roads Club, C. L. Tabor, secretary, Glen Saint Mary.
 Bradford County Good Roads Association, E. L. Odom, president, Lake Butler.
 Citrus County Good Roads Association, J. Y. Barnes, president, Lecanto.
 Clay County Good Roads Association, V. D. Eddy, president, Green Cove Springs.
 Dade County:
 Miami Automobile and Good Roads Association, C. H. Warde, secretary, Miami.
 De Soto Good Roads Association, Ed Scott, president, Arcadia.
 Duval County Good Roads Committee, Board of Trade, H. H. Richardson, secretary, Jacksonville.
 Hamilton County Good Roads Association, C. L. Adams, president, Jasper.
 Tampa Board of Trade, Good Roads Committee, Mr. Powell, secretary, Tampa.
 Jefferson County Good Roads Association, John Pasco, president, Monticello.
 Lake County Good Roads Association, P. A. Ross, president, Eustis.
 Lee County Good Roads Association, Dr. M. O. Tarry, president, Fort Myers.
 Marion County Good Roads Association, Ed Carmichael, president, Ocala.
 Nassau County Good Roads Association, O. L. Vensel, Chairman, Hilliard.
 Oasco County Good Roads Association, C. A. Lock, president, Dade City.
 Ocoola County Good Roads Association, H. C. Stanford, president, Kissimmee.
 Orange County Good Roads Association, M. O. Overstreet, president, Orlando.
 Palatka County Good Roads Association, Geo. B. Seldon, president, Palatka.
 Pinellas County Good Roads Association, C. S. Washington, president, Safety Harbor.
 Pinellas County Good Roads Association (St Petersburg Branch) A. W. Fisher, president, St. Petersburg.
 Polk County Good Roads Association, E. C. Stewart, president, Bartow.
 St. Lucie County Good Roads Association, J. K. Williams, secretary, Ft. Pierce.
 Volusia County Good Roads Association, Captain A. B. Dunning, president, Deland.

Georgia

Georgia Federation of Road Authorities, William F. Eve, president, Augusta.
 Georgia Good Roads Club, Fred L. White, President, Buckhead.
 South Georgia Good Roads Association, L. V. Williams, president; C. F. Andrews, secretary, Wayercross.
 Central Route Association, Captain H. H. Tift, president, Tifton.

- Battlefield Route Association, George A. Veach, president; Adams Park. W. H. Field, secretary, Cartersville.
- Georgia-Alabama Good Roads Association, F. C. Lumpkin, president, Eufaula.
- North Georgia Good Roads Association, A. N. Tumlin, president, Cave Springs.
- Appling County Good Roads Association, W. H. Tilman, president, Sur-rency.
- Ben Hill County Good Roads Club, J. G. Knapp, president, Fitzgerald; F. H. Atkinson, secretary, Fitzgerald.
- Berrien County Good Roads Association, Daniel McCraney, president, Sparks.
- Brooks County Good Roads Association, H. W. Stubbs, president, Quitman.
- Butts County Good Roads Association, S. J. Smith, president, Jackson.
- Charlton County Good Roads Association. P. T. Osterman, president, St. George.
- Clarke County Good Roads Association, Martin J. Abney, president, Athens.
- Clinch County Good Roads Association, J. T. Dame, president, Homer-ville.
- Crawford County Good Roads Association, S. H. Phelan, president, Roberta.
- Crisp County Good Roads Association, Cordele.
- Dodge County Good Roads Association, Sol Herrman, president, Eastman.
- Dooley County Good Roads Association, J. O. Heard, president, Vienna.
- Douglas County Good Roads Association, A. S. Gresham, president, Doug-lasville.
- Elbert County Good Roads Association, L. M. Brown, president, Elberton. R. F. D. No. 3.
- Fayette County Good Roads Association, A. O. Blolock, president, Fay-ettsville.
- Glasscock County Good Roads Association, Albert Logue, president, Gib-son.
- Glynn County Good Roads Association, Albert Fendig, president, Bruns-wick.
- Grady County Good Roads Association, W. B. Roddenberg, president, Thomasville.
- Greene County Good Roads Club, W. P. McWhorter, president, Woodville; J. C. Williams, secretary, Greensboro.
- Habersham County Good Roads Association, Willaim Eberhardt, president; W. S. Irwin, secretary, Clarksville.
- Hall County Good Roads Association, J. M. Mundy, president, Gainesville.
- Hart County Good Roads Association. L. S. Brown, president, Hartwell. R. F. D. No. 1.
- Houston County Good Roads Association, J. L. Fincher, president, Ft. Valley.
- Jackson County Good Roads Association, W. C. Davis, president, Com-merce
- Jeff Davis County Good Roads Association, N. L. Hatton, president, Hazel-hurst.
- Jefferson County Good Roads Association, W. J. Wrens, president, Wrens.
- Liberty County Good Roads Association, Dr. D. W. Baggs, president, Ludowici.
- Meriwether County Good Roads Association, J. M. Barnes, president, Bullochville.
- Mitchell County Good Roads Association, H. P. Butler, president, Camilla.
- Monroe County Good Roads Association, Col. J. O. Persons, president, Forsyth.

Newton County Good Roads Club, L. W. Jarman, president, Porterdale.
 Pierce County Good Roads Association, L. W. Root, president, Blackbear.
 Pike County Good Roads Association, W. A. Strickland, president, Concord.
 Pulaski County Good Roads Association, T. D. Walker, president, Cochran.
 Rabun County Good Roads Association, A. J. Duncan, president, Clayton.
 R. F. D. No. 1.
 Richmond County Good Roads Association, D. C. Haynes, president, Augusta.
 Taylor County Good Roads Club, W. D. Steed, president, Butler.
 Telfair County Good Roads Association, Captain T. J. Smith, president, McRae.
 Tift County Good Roads Association, Captain, H. H. Tift, president; W. E. Farmer, secretary, Tifton.
 Thomas County Good Roads Association, James Watt, president, Thomasville.
 Turner County Good Roads Association, J. S. Shingler, president, Ashburn.
 Upson County Good Roads Association, O. B. Clements, president, Yatesville.
 Ware County Good Roads Association, Dr. G. P. Folks, president, Waycross.
 Worth County Good Roads Association, T. C. Jeffords, president, Sylvester.
 Washington County Good Roads Association, C. H. Shepard, president, Tennille.
 Wayne County Good Roads Association, W. J. Broadhurst, president, Jesup.

Idaho

Ada County Good Roads Association, McCready Sykes, secretary, Boise.

Indiana

Northern Indiana Good Roads Association, Aaron Jones, president; C. E. Craybill, secretary, South Bend.
 Indiana Letter Carriers' Association, Good Roads Committee, W. J. Ward, chairman, Carmel.
 Indiana Federated Commercial Clubs, Good Roads Committee, Ft. Wayne.
 Good Roads Association, T. L. Wheeler, secretary, Huntington.
 Indiana Good Roads Association, C. A. Keyton, president, Claypool Building, Indianapolis.
 Hendricks County:
 Plainfield Improvement League, Dr. Amos Carter, president, Plainfield.
 Jefferson County Good Roads Association, John McGregor, president, Madison.
 Tippecanoe County:
 Purdue Engineering Club, Lafayette.

Illinois

Illinois Highway Improvement Association, Wm. G. Edens, president; Central Trust Company; R. J. Finnegan, secretary, 15 South Market Street, Chicago.
 Waterman Coöperative Good Roads League, Dr. C. H. Wilkenson, president; W. T. Wiltberger, secretary, Waterman.
 Effingham County Good Roads Association, A. D. McCallen, president, Effingham.

Effingham Good Roads Club, J. H. Curry, secretary, Effingham.

Henry County:

Galva Good Roads Improvement Association, John Miller, chairman, Galva.

Jo Daviess County

Progressive Good Roads Club, Dr. D. G. Smith, president, C. A. Walters, secretary, Elizabeth.

Rock Island County:

Black Hawk Good Roads Association, D. W. Matthews, president, Milan.

St. Clair County:

Good Roads Coöperative League, G. G. Bock, president, Smithton.

Iowa

Iowa Good Roads Association, Lafayette Young, president, Des Moines; T. H. MacDonald, secretary-treasurer, Ames.

River Road Association, J. W. Eichinger, secretary, Des Moines.

Iowa State Quarrymen's Association, James W. Burroughs, secretary, Marshalltown.

Kansas

Kansas State Good Roads Association, H. G. James, president, Independence; W. S. Gearhart, secretary-treasurer, Manhattan.

Kansas Engineering Society, R. V. Leeson, president, Topeka; W. S. Gearhart, secretary-treasurer, Manhattan.

Topeka-Shawnee Good Roads Association, Clarence Skinner, secretary-treasurer, Topeka.

Golden Belt Road Association, G. E. Munzenmayer, president, Junction City; B. W. Smith, secretary, Manhattan.

Meridian Road Association, W. W. Watson, president, Salina; John C. Nicholson, secretary, Newton.

Old Sante Fe Trail Association, Frank A. Davis, secretary, Herington.

The Sunflower Trail, R. M. Anderson, president; Dr. C. B. Kern, secretary, Beloit.

Tri-State Trail Association, H. O. Douglas, president, Oberlin; Charles Sawyer, secretary, Norton.

Cloud County Good Roads Association, P. G. Harmon, secretary-treasurer, Concordia.

Geary County Good Roads Association, Dr. W. S. Yates, president, O. E. Hutchings, secretary-treasurer, Junction City.

Graham County Good Roads Association, William Burns, president, Bogue. D. C. Green, secretary, Hill City.

Montgomery County Good Roads Association, H. G. James, president, Independence; Sam L. McMurtry, secretary, Coffeyville.

Cherryvale Good Roads Association, H. M. Casebeer, president; F. B. Moffett, secretary-treasurer, Cherryvale.

Kentucky

Kentucky Good Roads Association, Joseph Bosworth, president, Middlesboro.

Southeastern Kentucky Good Roads Association, U. R. Patterson, president; Miss Lena Rollins, secretary, Pineville.

Kenton County Good Roads Association, W. L. White, secretary, R. F. D. No. 1, Latonia.

Louisiana

Baton Rouge-New Orleans Good Roads Association, F. B. McQuesty, secretary, Baton Rouge.
 Acadia Parish Good Roads Association, H. E. Lewis, president, Crowley.
 Calcasieu Parish Good Roads Association, Dr. J. W. Ways, president, Kinder.
 Iberia Parish Good Roads Association, Dr. Guy Shaw, president, Loreanville.
 St. Landry Parish Good Roads Association, James O. Chachere, president, Opelousas.

Maine

Aroostook County Good Roads Association, Howard W. Safford, president, Mars Hill; Michael M. Clark, secretary, Houlton.
 Kennebunk Good Roads Association, Dr. Frank M. Ross, president; Frank W. Bowser, secretary, Kennebunk.

Maryland

Interstate Good Roads Association, Chas E. Shelton, superintendent, Mountain Lake Park.
 Baltimore County Good Roads Association, Frank Shipley, president, Gwynnbrook; W. H. McAllister, secretary, Hamilton.

Massachusetts

Massachusetts Highway Association, John M. McCarthy, secretary, 15 Ashburton Place, Boston.

Michigan

Michigan Good Roads Association, Philip T. Colgrove, president, Hastings, Thomas Saddler, secretary-treasurer, Jackson.
 Berrien County Good Roads Association, J. M. Ball, president; J. W. Allen, secretary, St. Joseph.
 Houghton County Good Roads Association, Hancock.
 Montcalm County Good Roads Association, M. W. Stevenson, president, D. A. Towle, secretary, Stanton.
 Wexford County Good Roads Association, E. B. Kelly, president, Cadillac; T. H. Myers, secretary, Manton.

Minnesota

Minnesota Road Maker's Association, John H. Mullen, secretary, St. Paul.
 New Prague Good Roads Association, John J. Kovarik, secretary, New Prague.

Mississippi

Gulf Coast Good Road. Association, M. P. Bouslog, secretary, Gulfport.
 Good Roads Committee, E. H. Babbitt, secretary, Okolona.
 Oktibbeha County Good Roads Association, J. W. Eckford, secretary, Starkville.
 Panola County Good Roads Association, C. Q. Moore, chairman, Sardis.

Missouri

North Missouri Cross-State Highway Association, George Robertson, President, Mexico; John F. Morton, secretary, Richmond.

- Capital Route State Highway Association, J. H. Bothwell, president, Sedalia.
- Old Trails Road Association, Col. J. M. Lowe, president, Kansas City; Howard Ellis, secretary, New Florence.
- Sedalia-Springfield Highway Association, W. S. Jackson, president, Warsaw, M. V. Carroll, secretary, Sedalia.
- St. Joe-Des Moines Air Line Association, A. J. Smith, president; H. C. Beard, secretary, Mt. Ayr, Iowa.
- Cannon Ball Trail Association, James R. Bowsher, president, Leon; Chas. D. Davis, secretary, Princeton.
- Short Line Route Association, M. H. Hall, president; F. S. Travis, secretary, Tarkio.
- Highway Engineers' Association of Missouri, L. M. Stallard, president, St. Joseph; Jos. E. Warner, secretary, Benton.
- Missouri Association of County Judges, G. W. Pine, president, Palmyra; Curtis Hill, secretary, Columbia.
- Hannibal and St. Joseph Cross-State Highway Association, C. F. Adams, president, Chillicothe; Sydney J. Roy, secretary-treasurer, Hannibal.
- Barry County Good Roads Association, J. F. Mermoud, president, Monett; Bert Robbins, secretary, Cassville.
- Barton County Good Roads Association, W. J. Evilsizer, president, James Graham, secretary-treasurer, Lamar.
- Westline Good Roads Association, G. W. Stark, secretary, Westline.
- Daviess County Good Roads Association, George A. Iddings, president, R. R. No. 4, Pattonsburgh; Harvey B. Miller, secretary, Gallatin.
- Franklin County Good Roads Association of St. Clair, Dr. C. E. Briegleb, president, Dr. W. E. Kitchell, secretary, St. Clair.
- Chariton Township Good Roads Association, Owen Harrison, president; E. W. Price, secretary, Glasgow.
- Jasper County 365 Day Road Club, J. D. Clarkson, president; Chas. A. Blair, secretary, Carthage.
- Perry County Good Roads Association, Robert H. Hudson, president, St. Marys; J. F. De Lassus, secretary, Crosstown.
- St. Louis County Highway and Waterway Association, Gottlieb Bayer, president, Chesterfield; Fred Mueller, secretary, Clayton.
- St. Louis County Olivette-Stratman Improvement Association, M. B. Greensfelder, president; H. H. Elbring, secretary, Clayton.
- Vernon County:
Nevada Good Roads Club, R. A. Buckner, president; J. M. Clack, secretary, Nevada.

Montana

- Montana Good Roads Convention, H. M. Brayton, secretary, Billings.
- Montana Good Roads Congress, Ed Donlan, president, Missoula.
- Committee on State Roads Project, Montana Society of Engineers, Clinton H. Moore, secretary, Butte.

Nebraska

- Meridian Road Association, Charles Baugh, secretary, York; R. L. Castile, Secretary, Stromsburg; F. O. Edgecomb, secretary, Geneva; G. W. Phillips, Secretary, Columbus; M. C. Garrett, secretary, Madison; A. Koyen, secretary, Norfolk.
- Boone County Good Roads Association, D. J. Poynter, secretary, Albion.
- Butler County Good Roads Association, Guy Walling, secretary, David City.
- Colfax County Good Roads Association, J. E. McNabb, secretary, Schuyler.

Dodge County Good Roads Association, George F. Staata, secretary, Fremont.
 Douglas County Good Roads Association, W. J. Kirkland, secretary, Omaha.
 Howard County Good Roads Association, A. L. Baliman, secretary, St. Paul.
 Lancaster County Good Roads Association, Fred C. Fiske, secretary, Lincoln.
 Madison County Good Roads Association, C. B. Salter, secretary, Madison.
 Nance County Good Roads Association, J. D. Barnes, secretary, Fullerton.

New Jersey

New Jersey Association of County Engineers, William E. King, president, Morristown; E. E. Reed, secretary, Trenton.

New Mexico

New Mexico Good Roads Association, Hon. L. Bradford Prince, president, Santa Fe.
 New Mexico Committee of Ocean-to-Ocean Highway Association, D. K. B. Sellers, chairman, Albuquerque; C. D. Miller, secretary, Santa Fe.
 Dona Anna County Good Roads Committee, W. A. Southerland, chairman, Las Cruces.
 Lincoln County Good Roads Association, J. W. Laws, chairman, Lincoln.

New York.

New York State Road Builders Association, E. H. Van Hoesen, secretary, 25 North Pearl Street, Albany.
 International League for Highway Improvement, John A. Stewart, chairman, 50 Church Street, New York.
 Monroe County:
 Phillipstown Good Roads Association, Henry Metcalf, secretary, Cold Springs.

North Carolina

North Carolina Good Roads Association, Joseph H. Pratt, Chapel Hill.
 Central Highway Association, H. B. Varner, president, Lexington.
 Charlotte-Wilmington Highway Association, A. D. Skelding, secretary, Charlotte.
 Anson County Good Roads Association, Dr. W. J. McLendon, president, Wadesboro; T. V. Howell, secretary-treasurer, Peachland.
 Beaufort County Good Roads Association, Geo. T. Leach, president; R. R. Warren, secretary, Washington.
 Buncombe County Good Roads Association, E. C. Chambers, president; B. M. Jones, secretary-treasurer, Asheville.
 Bridgewater Township Good Roads Association, W. Lysterly, president; R. A. Abernathy, secretary-treasurer, Bridgewater.
 Burke County Good Roads Association, J. E. Erwin, president, Morganton.
 Connellys Springs Good Roads Association, Allis Coulter, president; J. L. Sides, secretary, Connellys Springs.
 Glen Alpine Township Good Roads Association, Dr. E. A. Hennessee, president, J. H. Giles, secretary-treasurer, Glen Alpine.
 Hildebran Township Good Roads Association, J. W. Beach, president; A. L. Yoder, secretary-treasurer, Hildebran.
 Little River Township Good Roads Association, J. F. Steele, president; F. M. Whitner, secretary, R. F. D. No. 2, Lenoir.

- Camden County Good Roads Association, P. W. Stevens, president, Shiloh; E. I. Sawyer, secretary-treasurer, Camden.
- Carteret County Good Roads Association, C. S. Wallace, president; M. L. Willis, secretary-treasurer, Morehead City.
- Catawba County Good Roads Association, R. L. Shuford, president, R. F. D. No. 1, R. P. Caldwell, secretary, Newton.
- Chatham County Good Roads Association, James B. Atwater, president, Bynum; Frank D. Jones, secretary-treasurer, Gulf.
- Chowan County Good Roads Association, J. H. McMullan, Jr., president; H. L. Story, secretary-treasurer, Edenton.
- Columbus County Good Roads Association, G. Herbert Smith, president, Cronly; K. Clyde Council, secretary, Wananish.
- Craven County Good Roads Association, R. A. Nunn, president; W. G. Boyd, secretary, Newbern.
- Cumberland County Good Roads Association, T. G. McAllister, president; W. M. Walker, secretary, Fayetteville.
- Currituck County Good Roads Association, H. C. Hosier, president, Moyock; E. R. Johnson, secretary-treasurer, Currituck.
- Hollygrove Good Roads and Agricultural Association, of Conrad Hill Township, C. A. Swink, president; James F. Deal, secretary-treasurer, R. F. D. No. 2, Lexington.
- Davie County Good Roads Association, T. J. Byerly, president, Mocksville; T. V. Terrell, treasurer, Cooleemee.
- Duplin County Good Roads Association, Island Creek Township, George R. Ward president; W. B. Brice, secretary-treasurer, Wallace.
- Durham County Good Roads Association, Dr. A. Cheatham, president; P. C. Graham, secretary-treasurer, Durham.
- Forsyth County Good Roads Association, H. R. Starbuck, president, Winston-Salem.
- Gates County Good Roads Association, Lyeurgus Hofler, president; S. P. Cross, secretary-treasurer, Gatesville.
- Granville County Good Roads Association, T. G. Currin, president; R. P. Coble, secretary-treasurer, Osford.
- Guilford County Good Roads Association, J. Van Lindley, president; S. L. Trogden, secretary-treasurer, Greensboro.
- Halifax County Good Roads Association, John L. Patterson, president, Roanoke Rapids; Charles J. Shields, secretary-treasurer, Scotland Neck.
- Harnett County Good Roads Association, Dr. J. W. Halford, chairman; C. D. McNeely, secretary, Chalybeate Springs.
- Haywood County Good Roads Association, F. W. Miller, president; James Atkins, secretary-treasurer, Waynesville.
- Hertford County Good Roads Association, A. C. Vann, president, Ahoskie; W. A. Thomas, secretary, Cofield.
- Johnston County:
Benson Township Good Roads Association, P. B. Johnson, president; R. F. Smith, secretary-treasurer, Benson.
Johnston County Good Roads Association, W. M. Sanders, president, Smithfield; C. M. Wilson, secretary-treasurer, Wilsons Mills.
- Jones County Good Roads Association, R. L. May, president; John R. Barker, secretary, Trenton.
- Lee County Good Roads Association, J. B. Watson, president; T. S. Cross, secretary, Jonesboro.
- Lenoir County Good Roads Association, Dr. J. M. Parrott, president, C. W. Howard, secretary-treasurer, Kinston.
- McDowell County:
Old Fort Township Good Roads Association, Dr. F. W. Ihne, Graphiteville.

Macon County Good Roads Association, T. M. Green, president, Franklin.
 Madison County Good Roads Association, Jasper Ebbs, president, Spring
 Creek; Dudley Chipley, secretary-treasurer, Marshall.

Madison County:

Hot Springs Good Roads Association, N. J. Lance, president; S. W.
 Brown, secretary, Hot Springs.
 Martin County Good Roads Association, W. C. Manning, president; C. H.
 Godwin, secretary-treasurer, Williamston.
 Mecklenburg County Good Roads Association, F. M. Shannonhouse, sec-
 retary, Charlotte.
 Mitchell County Good Roads Association, George K. Pritchard, chairman;
 W. C. Berry, secretary, Bakersville.
 Montgomery County Good Roads Association, Frank Page, president,
 Biscoe; O. B. Deaton, secretary-treasurer, Troy.
 Moore County Good Roads Association, Leonard Tufts, president; J. R.
 McQueen, secretary-treasurer, Pinehurst.
 Northampton County Good Roads Association, John E. Moore, president,
 Jackson; A. J. Connor, secretary, Rich Square.
 Orange County Good Roads Association, Frank Nash, president; T. W.
 Andrews, secretary-treasurer, Hillsboro.
 Pasquotank County Good Roads Association, W. J. Williams, president, R.
 F. D. No. 4; G. R. Little, secretary-treasurer, Elizabeth City.
 Pender County Good Roads Association, George J. Moore, president,
 Atkinson; Laughlin McNeill, secretary-treasurer, Burgaw.
 Perquimans County Good Roads Association, T. F. Winslow, president;
 W. B. Hudson, secretary-treasurer, Hertford.
 Person County Good Roads Association, W. E. Morton, president; J. W.
 Noell, secretary-treasurer, Roxboro.
 Randolph County Good Roads Association, J. E. Williamson, president,
 Worthville; S. W. Loughlin, secretary-treasurer, Ashboro.
 Richmond County Good Roads Association, W. I. Everett, president; B.
 F. Reynolds, secretary-treasurer, Rockingham.
 Robeson County Good Roads Association, A. E. White, secretary-treasurer
 Lumberton.
 Rockingham County Good Roads Association, J. P. Richardson, secretary,
 Reidsville.
 Tyrrell County Good Roads Association, F. L. W. Cahoon, president, Colum-
 bia; H. S. Swain, secretary-treasurer, Jerry.
 Union County Good Roads Association, W. C. Heath, president; W. B.
 Love, secretary, Monroe.
 Wake County Good Roads Association, Dr. J. M. Templeton, president,
 Cary; Edward C. Britton, secretary-treasurer, Raleigh.
 Washington County Good Roads Association, T. W. Blount, president,
 Roper; W. M. Bateman, secretary-treasurer, Plymouth.
 Wayne County Good Roads Association, G. C. Royal, president; G. A.
 Norwood, secretary-treasurer, Goldsboro.
 Wilkes County Good Roads Association, R. Don Laws, president, Moravian
 Falls; Bruce Craven, secretary-treasurer, North Wilkesboro.
 Yadkin County Good Roads Association, F. W. Hanes, chairman; W. E.
 Rutledge, secretary, Yadkinville.

North Dakota

North Dakota Good Roads Association, J. H. Sheppard, president, Agri-
 cultural College; Nels K. Matson, secretary, New Rockford.

Ohio

- Ohio Good Roads Federation, A. H. Huston, president, 208 Schultz Building, Cleveland; Jesse Taylor, secretary, Jamestown.
- Allen County Good Roads Association, D. J. Cable, president, Lima.
- Ashland County Good Roads Association, L. Brindle, president, Lotta Westover, secretary, Ashland.
- Carroll County Good Roads Association, J. A. Lee, president, Harlem Springs; J. F. Loyde, secretary, Carrollton.
- Columbiana County Good Roads Association, J. H. French, president, Salem; Russell Heddersten, secretary, East Liverpool.
- Coshocton County Good Roads Association, T. J. Hanley president, H. B. Hunt, secretary, Coshocton.
- Cuyahoga County Good Roads Association, Dr. A. F. Voak, president, 8101 Hough Avenue, M. M. Maswell, secretary, 1211 Citizens' Building, Cleveland.
- Fayette County Good Roads Association, Reuben Rankin, president, Parrott.
- Franklin County Good Roads Association, E. A. Peters, president, Groveport; William H. Maize, secretary, 406 Harrison Building, Columbus.
- Geauga County Good Roads Association, Carl Harper, president; Ray Douglass, secretary, Chardon.
- Greene County Good Roads Association, H. N. Ensign, president, Jamestown; R. S. Dean, secretary, R. F. D., Xenia.
- Hardin County Good Roads Association, L. X. Bixler, president, Kenton.
- Harrison County Good Roads Association, W. F. Hedges, president, R. F. D. No. 4; O. J. McFadden, secretary, R. F. D. No. 4, Cadiz.
- Holmes County Good Roads Association, J. G. Bilderbock, president; John Burkey, secretary, R. F. D. No. 6, Millersburg.
- Jefferson County Good Roads Association, Albert G. Lee, secretary, Steubenville.
- Knox County Good Roads Association, H. C. Devine, president; W. G. Rimer, secretary, Mount Vernon.
- Lake County Good Roads Association, E. E. Lawrence, president, Fairport Harbor; S. S. Wilson, secretary, Willoughby.
- Painesville Local Association, C. A. Hine, president; B. A. Crawfoot, Secretary, Painesville.
- Monroe County Good Roads Association, L. E. Motz, president, Woodsfield.
- Montgomery County Good Roads Association, Dr. F. D. Baker, president; W. J. Anderson, secretary, Dayton.
- Morgan County Good Roads Association, W. E. Dye, president; F. P. Parsons, secretary, R. F. D. No. 3, McConnellsville.
- Muskingum County Good Roads Society, George Hardschy, president; William J. Mason, secretary, Zanesville.
- Perry County Good Roads Association, Ed Howerth, president; C. W. King, Secretary, New Lexington.
- Preble County Good Roads Association, C. W. Bloom, president; C. G. Hawley, secretary, New Paris.
- Putnam County Good Roads Association, B. F. Sietz, president, Columbus; A. M. Heidlebaugh, secretary, Ottawa.
- Richland County Good Roads Association, A. B. Pulver, president; C. E. Scott, secretary, Mansfield.
- Scioto County Good Roads Association, L. Taylor, president, Rarden.
- Seneca County Good Roads Association, Borton Metzger, president, Clyde; E. L. Volkmoor, secretary, Tiffin.
- Tuscarawas County Good Roads Association, H. B. Fibley, president, New Philadelphia; C. L. Graves, secretary, Uhrichsville.

Washington County Roads Association, N. N. Thorniley, president; J. H. Deval, secretary, Marietta.

Wayne County Good Roads Association, Hon. Ed. S. Wertz, Wooster.

Williams County:

Automobile and Good Roads Association, William Behne, secretary, Bryan.

Williams County Good Roads Association, Frank Dolph, president, West Unity; C. C. Lloyd, secretary, Montpelier.

Oklahoma.

Oklahoma State Good Roads Association, W. R. Goit, president; C. C. Hudson, secretary, Oklahoma City.

Oregon.

Oregon Association for Highway Improvement, Walter L. Priest, secretary, 607 Beck Building, Portland.

Oregon Good Roads League, Victor P. Morse, president; Prof. E. F. Ayres, secretary, Oregon Agricultural College, Corvallis.

Pennsylvania.

Good Roads Advocate Association, Walter R. Markley, secretary, Lancaster.

Good Roads Association, W. G. Triebly, Ashland.

Pennsylvania Good Roads Association, Howard Longstreet, secretary, Philadelphia.

Road Tax-Payers Association, J. G. Eckert, secretary, Drifton.

Armstrong County Road Supervisors' Association, John T. Deemer, secretary, Kittanning.

Bucks County Road Supervisors' Association, J. Gibbs Buchman, secretary, Eden.

Cambria County:

Executive Committee, Road Improvement Commission, W. W. Bailey, chairman, Johnstown.

Chester County Road Supervisors' Association, Elwood C. Cox, secretary, Kennett Square.

Crawford County Road Supervisors' Association, G. Beatty, secretary, Meadville.

Erie County Road Supervisors' Association, H. G. Havens, secretary, R. F. D. No. 4, Erie.

Fayette County Good Roads Association, Ernest H. Rowe, secretary, Uniontown.

Indiana County Good Roads Association, Joe J. Campbell, secretary, R. F. D. Homer City.

Lycoming County Good Roads Association, Ralph Gibson, secretary, Williamsport.

Monroe County Good Roads Association, Norman Huffman, secretary, Stroudsburg.

Montgomery County Road Supervisors' Association, J. B. Krause, secretary, Sanatoga.

Potter County Road Supervisors' Association, R. R. Tunis, secretary, Coudersport.

Tioga County Road Supervisors' Association, J. A. Reese, secretary, Wellsboro.

Venango County Road Supervisors' Association, Richard Kounerdell, secretary, Franklin.

Wayne County Road Supervisors' Association, Bert S. Hull, secretary, Waymart.
 Westmoreland County Road Goads Association, Crombie Allen, secretary, Greensburg.
 Wyoming County Road Supervisors' Association, J. E. Pearson, secretary, Shinners Eddy.

Rhode Island.

League of Improvement Societies in Rhode Island, Committee on Highways, Nathan T. Bacon, Peacedale, Herbert J. Wells, Providence: William L. Hodgeman, Providence, George L. Crocker, secretary of Committee, Providence.

South Carolina.

Good Roads and Drainage League, James Cosgrove, president, 36 Broad Street, Charleston.
 South Carolina Good Roads Association, Fingal C. Black, secretary, Columbia.
 Abbeville County Good Roads Association, Dr. C. C. Cambrell, president, Abbeville.
 Aiken County Good Roads Association, J. T. Shuley, president, Aiken.
 Anderson County Good Roads Association, W. L. Brissey, president, Anderson.
 Barnwell County Good Roads Association, W. Z. Bryan, president, Alledale.
 Bamberg County Good Roads Association, S. G. Mayfield, president, Bamberg.
 Calhoun County Good Roads Association, J. M. Moss, president, St. Matthew.
 Charleston County Good Roads Association, J. M. Connelly, president, Charleston.
 Cherokee County Good Roads Association, T. B. Butler, president, Gaffney.
 Chester County Good Roads Association, John R. Alexander, president, Chester.
 Dorchester County Good Roads Association, John A. Hiers, president, St. George.
 Edgefield County Good Roads Association, S. B. Mayers, president, Edgerfield.
 Greenwood County Good Roads Association, W. L. Anderson, president, Hodges.
 Kershaw County Good Roads Association, W. C. West, president, Camden.
 Lancaster County Good Roads Association, W. U. Clyburn, president, Kershaw.
 Marion County:
 Road and Highway Commission, L. D. Lide, clerk, Marion.
 Newberry County Good Roads Association, Dr. W. C. Brown, president, R. F. D. Newberry.
 Oconee County Good Roads Association, A. P. Crisp, president, Walhalla.
 Orange County Good Roads Association, F. J. D. Felder, president, Orangeburg.
 Pickens County Good Roads Association, W. T. O'Dell, president, Liberty.
 Spartanburg County Good Roads Association, S. T. D. Lancaster, president, Pauline.
 Sumter County Good Roads Association, S. A. Harvin, president, Sumter.
 Union County Good Roads Association, J. H. Spears, president, Union.
 York County Good Roads Association, R. T. Fewell, president, Rock Hill.
 Williamsburg County:
 Good Roads Commission, J. A. Kelly, president, Kingstree.

South Dakota.

Brown County:

- Public Improvement Club, W. B. Miller, secretary, Groton.
 Hutchinson County Meridian Road Club, A. J. Waltner, secretary, Freeman.
 Roberts County Good Roads Association, S. E. Oscarson, secretary, White Rock.
 Meridian Road Committee, Henry S. Morris, chairman, Sisseton.

Tennessee.

- East Tennessee Good Roads Association, Henry R. Brown, president, Greenville.
 Western Tennessee Good Roads and Drainage Association, J. D. Johnson, president, Henderson.
 Memphis-Bristol Highway Association, George A. Gowan, president, 1201 Woodland Street; C. C. Gilbert, secretary, Stahlman Building, Nashville.
 Anderson County Good Roads Association, W. L. Owen, president, Clinton.
 Bradley County Good Roads Association, J. W. Beard, president, Cleveland.
 Fayette County Good Roads Association, E. A. Maddox, president, Somerville.
 Grainger County Good Roads Association, A. E. Foster, president, Lea Springs.
 Knox County Good Roads and Park Association, Cyrus Kehr, president, 607 Empire Building, Knoxville.
 Loudon County Good Roads Association, J. W. Norwood, president, Martel.
 McMinn County Good Roads Association, R. J. Fisher, president, Athens.
 Madison County Good Roads Committee, R. A. Hurt, secretary, Jackson.
 Monroe County Good Roads Association, C. F. Latimer, president, Madisonville.
 Roane County Good Roads Association, W. C. Shaw, president, Harriman.

Texas.

- Texas Good Roads Association, G. W. Baker, secretary, Dallas.
 Texas Industrial Congress, Henry Exall, president; W. C. Barrickman, secretary, Dallas.
 Gulf Coast Good Roads Association, J. H. Hawley, secretary-manager, Galveston.
 Alvin Good Roads Association, E. L. Long, secretary, Alvin.
 Brazoria County Good Roads Association, W. C. Stockton, president, Angleton.
 Brazos County Good Roads Club, L. M. Hewitt, secretary, Bryan.
 Brown County Good Roads Club, D. F. Johnson, secretary, Brownwood.
 Calhoun County Good Roads Association, J. J. Frick, president, SeaDrift.
 Cameron County Good Roads Association, E. A. McGary, president, Brownsville.
 Eagle Lake Good Roads Club, T. L. Smith, secretary, Eagle Lake.
 Dallas County Good Roads Club, J. F. Zang, president, Dallas.
 Dimmitt County Good Roads Club, R. B. White, president, Carrizo Springs.
 Fall County Good Roads Club, G. H. Carter, president, Marlin.
 Fannin County Good Roads Club, F. M. Gibson, president, Bonham.
 Franklin County Good Roads Association, F. S. Estes, secretary, Franklin.
 Grayson County:
 Denison Good Roads Club, J. M. Madden, president, Denison.

Hidalgo County Good Roads Association, Mr. Cunningham, president, Mission.
 Hopkins County Good Roads Club, F. W. Mack, secretary, Sulphur Springs.
 Hunt County Good Roads Club, Greenville.
 Beaumont and Jefferson County Good Roads Association, Sam Park, president, Beaumont.
 Jefferson County Good Roads Club, T. W. Larkin, secretary, Beaumont.
 Kerr County Good Roads Club, Arthur Beal, president, Kerrville.
 Lamar County Good Roads Association, T. J. Record, president, Paris.
 Paris Good Roads Club, W. H. Ragland, secretary, Paris.
 Matagorda County Good Roads Association, S. H. Smith, president, Blessing.
 Newton County Good Roads Association, Prof. A. B. Alford, president, Burkeville.
 Nueces County Good Roads Association, W. H. McCracken, president, Kingsville.
 Orange County Good Roads Association, Geo. W. Bancroft, president, Orange.
 Refugio County Good Roads Association, L. J. Winters, president, Woodsboro.
 San Patricio County Good Roads Association, J. T. Mahenny, president, Matthews.

Virginia

Amelia County Good Roads Association, H. F. Green, president, Amelia.
 Culpeper County Good Roads Association, W. R. Pleak, president, Culpeper.
 Campbell County Good Roads Association, W. L. Garbee, president, Lawyer.
 Charlotte County Good Roads Association, B. P. Eggleston, president, Charlotte.
 Chesterfield County Good Roads Association, Howard Swineford, president, Richmond.
 Dinwiddie County Good Roads Association, J. E. Perkinson, chairman, Dinwiddie.
 Franklin County Good Roads Association, John B. Sanders, president, Rocky Mount.
 Fauquier County Good Roads Association, O. T. Crosby, president, Warrenton.
 Henry County Good Roads Association, J. R. Gregory, president, Martinsburg.
 Halifax County Good Roads Association, W. Holt Edwards, president, Houston.
 King William County Good Roads Association, Chas M. Brown, president, Sweet Hall.
 Lunenburg County Good Roads Association, E. P. Wallace, president, R. F. D., Meherrin.
 Mecklenburg County Good Roads Association, Lucius Gregory, president, Chase City.
 Nansemond County Good Roads Association, R. H. Beamon, president, Beamon.
 Nelson County Good Roads Association, Major W. M. Boyd, president, Arrington.
 Nottoway County Good Roads Association, T. M. Dillard, president, Blackstone.
 New Kent County Good Roads Association, W. J. Wallace, president, Tunstall.

Orange County Good Roads Association, C. C. Taliaferro, president
Orange.
Prince William County Good Roads Association, C. A. Heinekin, president,
Haymarket.
Pittsylvania County Good Roads Association, J. L. Carter, president,
Chatham.
Patrick County Good Roads Association, Dr. R. S. Martin, president,
Stuart.
Prince Edward County Good Roads Association, Dr. Wm. M. Holladay,
president, Hampden Sidney.
Southampton County:
Community Fair Association, T. B. Henderson, secretary, Boykins.
Spotsylvania County:
Fredericksburg Good Roads Association, E. D. Cole, president;
Thomas H. Harris, treasurer, Fredericksburg.
Shenandoah County Good Roads Association, M. H. Bowman, president,
Woodstock.
Warren County Good Roads Association, N. S. Waller, president, Front
Royal.
Wise County Good Roads Association, John W. Chalkley, president, Big
Stone Gap.

Washington

Country Life Commission, Edwin A. Smith, secretary, Spokane.
Pacific County Good Roads Association, T. H. Dixon, secretary, South
Bend.
Pierce County:
Long Branch Good Roads Improvement Association, Samuel S. Wat-
kins, secretary, Long Branch.
Spokane County Good Roads Association, J. A. Perry, secretary, Spokane.

West Virginia

West Virginia Road Engineers' Society, W. J. Alexander, president, New
Martinsville.
Good Roads Committee, West Virginia Board of Trade, Howard Suther-
land, chairman, Elkins.
Harrison County Good Roads Association, George B. Chorpeneing, president
Clarksburg.
Mineral County Good Roads Association, J. C. Watson, president, Keyser.
Greenville Road Association, B. F. Ball, president, Greenview.
Doddridge County Good Roads Association, H. H. Shinn, secretary, West
Union.

Wisconsin

Wisconsin Highway Commissioners' Association, G. F. Post, president,
Spring Green; George H. Mainwaring, secretary-treasurer, Gotham.
Oconomowoc-Milwaukee Road Association, L. J. Petit, Wisconsin National
Bank, Milwaukee.

Wyoming

Wyoming Highways Association, E. L. Emery president, Cheyenne; M. R.
Collins, secretary, Douglas.
Laramie Good Roads Club, Elmer Lovejoy, president, Laramie.
Good Roads Club of Douglas, M. R. Morsch, president; Wilkie Collins,
secretary, Douglas.
Laramie County Good Roads Association, E. L. Emery president, Chey-
enne; Roy W. Schenck, secretary, Cheyenne.
Sheridan Good Roads Club, George W. Perry, secretary, Sheridan.

MANUFACTURERS

National Association of Road Material and Machinery Manufacturers

Officers.—W. T. Beatty, president; S. Jones Philips, vice-president; Daniel T. Pierce, secretary-treasurer.

Headquarters.—32 Liberty Street, New York.

Purposes.—The objects of this Association shall be to arrange for and manage exhibitions of such road material and machinery as are the products of its members; to protect and further the business and interests of its members; to develop the relations existing between them, and to facilitate the interchange of ideas for their mutual benefit.

Membership.—The members of this Association shall be individuals, firms and corporations engaged in the manufacture of material and machinery used in the construction and maintenance of roads, provided that such manufacturers are not primarily contractors or agents for such material and machinery.

Manufacturers of Road Machinery

Austin Manufacturing Company, Wm. T. Beatty, president and manager; W. I. Babb, vice-president and secretary; H. S. Maclay, treasurer, Karpen Building, Chicago, Illinois (advertisement page 414).

American Metal Stamping Company (Inc.), 20 E. Herman Street, Germantown, Philadelphia, Pennsylvania.

Ames Plow Company, Oliver Ames, president; Fredk. B. Hill, treasurer, Boston, Massachusetts.

Allis-Chalmers Company, W. W. Nichols, vice-president, Milwaukee, Wisconsin.

American Steel Scraper Company, The, Sidney, Shelby County, Ohio.

American Road Machinery Company, Kennett Square, Pennsylvania.

Acme Road Machinery Company, Frankfort, New York (advertisement page 408).

A. Burlingame Company, Timothy E. Hopkins, president; Earle C. Hopkins, treasurer, Worcester, Massachusetts.

A. D. Baker Company, J. W. Chrisman, president; A. D. Baker, vice-president; M. Lochbiler, secretary; C. W. Chrisman, treasurer, Swanton, Fulton County, Ohio.

Buffalo Steam Roller Company, Henry S. Cunningham, president and treasurer; B. E. Holmes, secretary; L. P. Humphrey, assistant treasurer, Carolina and Fourth Streets, Buffalo, New York (advertisement page 417).

Earle C. Bacon, 26 Cortland Street, New York City.

- Baker Manufacturing Company, M. W. Baker, president; J. M. Baker, vice-president; J. G. Miller, secretary and treasurer, 505 Hunter Building, 337 W. Madison Street, Chicago, Illinois (advertisement page 415).
- The Bucyrus Steam Shovel Company, C. S. Reed, manager, 50 Church Street, New York City.
- A. L. Black Machinery Company, Boston, Massachusetts.
- George V. Cresson Company (Inc.), Alleghany Avenue, above 17th Street, Philadelphia, Pennsylvania.
- Climax Road Machine Company, J. R. Manning, president; S. Jones Philips, vice-president; T. R. Clark, secretary-treasurer, Marathon, Cortland County, New York.
- Chalmers and Williams (Inc.), Thos. S. Chalmers, president; Norman Williams, vice-president and treasurer; J. W. Young, second vice-president; W. B. Easton, secretary, Chicago Heights, Cook County, Illinois.
- J. I. Case Threshing Machine Company, Frank Bull, president; Fredk. Robinson, vice-president; F. R. Norton, treasurer; Richards S. Robinson, secretary; R. B. Coleman, sales manager, Racine, Racine County, Wisconsin (advertisement page 419).
- Canton Culvert Company, Julius Schlaflly, president; Chas. S. Haines, vice-president and superintendent; Perry Van Horne, secretary and treasurer and general manager, Canton, Ohio.
- Chain Belt Company, C. W. Levalley, president; Donald Fraser, vice-president and superintendent; W. C. Sargent, secretary; W. C. Frye, treasurer, 736 Park Street, Milwaukee, Wisconsin.
- Chicago Pneumatic Tool Company, W. O. Duntley, president; Chas. Booth, vice-president; LeRoy Beardsley, treasurer; W. B. Sealing, secretary; R. D. Bakes, auditor, 343 S. Dearborn Street, 10th Floor Fisher Building, Chicago, Illinois.
- Disc Grader and Plow Company, Allen L. Powlinson, president; W. H. Simmons, treasurer, 709 Andrus Building, Minneapolis, Minnesota.
- Deere and Company, William Butterworth, president; Charles C. Webber, vice-president; Geo. N. Peck, vice-president; Geo. W. Mixter, vice-president; Burton F. Peck, vice-president; Schiller Bosford, secretary; Geo. W. Crampton, treasurer, 3rd Avenue and 14th Street, Moline, Illinois.
- Eureka Machine Company, Harry F. Harper, president; L. M. Gleason, vice-president; C. J. Mears, secretary and treasurer, Lansing, Michigan.
- Eureka Stone and Ore Crusher Company, A. Freund, president; W. J. Konvalinka, first vice-president; A. Leunberger, second vice-president; Francis A. Heald, secretary; I. L. Mitchell, treasurer and manager, Cedar Rapids, Iowa.
- Eagle Wagon Works (Inc.), Frank E. Swift, president; Thos. M. Osborne, vice-president; Courtney C. Avery, secretary; Clarence F. Baldwin, treasurer, Auburn, Cayuga County, New York.
- Etnyre, E. D. and Company, E. D. Etnyre, sole proprietor, Oregon, Ogle County, Illinois.
- Erie Machine Company, P. W. Dietley, proprietor, Erie, Pennsylvania.
- R. K. Everett and Company, now the Spring Hill Construction Company, Cold Spring, Putnam Company, New York.
- Farrell Foundry and Machine Company, Franklin Farrel, president; Frank E. Hoadley, secretary; Franklin Farrel, Jr., assistant secretary; Charles F. Bliss, treasurer; Alton Farrell, assistant treasurer, Ansonia, Connecticut.
- Fairbanks Morse and Company (Inc.), C. H. Morse, president; W. E. Miller, first vice-president; H. C. McClary, second vice-president; F. M.

- Boughey, secretary; H. M. Hollister, treasurer, 900 S. Wabash Avenue, Chicago, Illinois.
- Frick Company (Inc.), A. O. Frick, president; Ezra Frick, vice-president and general manager; W. H. Manns, secretary; W. R. Snively, assistant secretary; D. Norris Benedict, treasurer; J. S. A. Wheeler, superintendent, Waynesboro, Pennsylvania (advertisement page 425).
- A. B. Farquhar Company Ltd., A. B. Farquhar, president; W. E. Farquhar, vice-president; Francis Farquhar, secretary, treasurer and superintendent, York, Pennsylvania (advertisement page 421).
- Geiser Manufacturing Company, D. M. Good, president; A. D. Morgenthall, first vice-president; C. B. Beaver, second vice-president; J. J. Oller, general manager; W. L. Minick, secretary, Waynesboro, Pennsylvania.
- Good Roads Machinery Company, 18 Old Slip, New York City (advertisement page 422).
- Glide Road Machine Company, Clyde Waterman, president; H. O. Thompson, vice-president; R. Waterman, manager, Minneapolis, Minnesota (advertisement page 430).
- Gardner Crusher Company, Ed. E. Gauche, treasurer, 556 W. 34th, Street, New York City.
- Goit Manufacturing Company, W. R. Goit, president; L. B. Taylor, secretary-treasurer, Oklahoma, Oklahoma.
- Galion Iron Works Company, Henry Gottdiener, president; G. L. Stiefel, vice-president; D. C. Boyd, secretary and manager; L. M. Liggett, treasurer, Galion, Ohio.
- Hart-Parr Company, C. W. Hart, president; A. E. Ellis, vice-president; C. R. Parr, treasurer, Charles City, Floyd County, Iowa.
- Holt Caterpillar Company, Pliny E. Holt, president; Benj. C. Holt, vice-president; G. L. Dickenson, secretary, Peoria, Illinois.
- Haywood Wagon Company, The, Walter A. Cook, president; James W. Jones, vice-president; H. Howard, secretary; L. L. Cramer, treasurer; John W. Haywood, general manager, Newark, Wayne County, New York.
- Huber Manufacturing Company, Marion, Ohio (advertisement page 415).
- Iroquois Iron Works, Arthur W. Sewall, president; A. D. Andrews, vice-president; Ira Atkinson, treasurer, Buffalo, New York (advertisement page 425).
- Indiana Road Machine Company, John Landenberger, president and treasurer; Chas. Stockman, Jr., secretary, Fort Wayne, Indiana.
- Ingersoll-Rand Company, W. L. Saunders, president; George Doubleday, first vice-president; W. R. Grace, vice-president and treasurer; Geo. R. Elder, vice-president; J. S. Phipps, vice-president; F. A. Brainard, secretary, 11 Broadway, New York City.
- International Harvester Company of America (Inc.), Harvester Building, Chicago, Illinois.
- Jeffrey Manufacturing Company, The, J. A. Jeffrey, president and treasurer; Robert H. Jeffrey, vice-president and general manager; Chas. W. Miller, secretary; B. Dierdorf and J. C. Crawford, superintendent, E. First Avenue, Columbus, Ohio.
- Koehring Machine Company, Wm. J. Koehring, president; Richard Keil, vice-president; Philip Koehring, secretary and treasurer, 615-17 Germania Building, Milwaukee, Wisconsin.
- Kelly-Springfield Road Roller Company, The, Chas. M. Greiner, president and treasurer; J. W. Bowman, vice-president; C. J. Foster, secretary, Springfield, Ohio.
- Kolesch and Company, (Inc.), Emilie Kolesch, president; Percy A. Kolesch, treasurer, 138 Fulton Street, New York City.
- Kilbourne and Jacobs Manufacturing Company, Jas. Kilbourne, president and general manager; Felix A. Jacobs, first vice-president; Jas. R.

- Kilbourne, second vice-president; F. W. Hubbard, secretary; P. C. Eaton, treasurer; Jos. D. Potter, assistant treasurer and auditor; Lincoln Kilbourne, purchasing agent, Columbus, Franklin County, Ohio.
- Milburn Wagon Company, The, president vacant, True W. Childs, vice-president; Horace W. Suydam, secretary; Frank Mafer, treasurer, 3124 Monroe Street, Toledo, Ohio.
- Municipal Engineering and Contracting Company, Fredk. C. Austin, president; Fredk. Hoard, vice-president; M. L. Purvin, secretary-treasurer, 609 Railway Exchange, 80 E. Jackson Boulevard, Chicago, Illinois.
- Munnsville Plow Company, J. E. Sperry, president; W. R. Paul, vice-president; W. Fay Bridge, secretary-treasurer, Munnsville, Madison County New York.
- Monarch Road Roller Company, Groton, Tompkins County, New York.
- New Holland Machine Company, (Inc.), A. M. Zimmerman, president and manager; Weaver Musselman, vice-president; P. S. Hess, secretary-treasurer, New Holland, Lancaster County, Pennsylvania.
- Ohio Manufacturing Company, The, A. B. Whitney, president and treasurer; W. E. Robinson, vice-president; Chas. C. Kouns, secretary, Upper Sandusky, Ohio.
- Oliver Chilled Plow Works, Joseph D. Oliver, president and treasurer; George Ford, secretary; James Oliver, (II,) secretary, South Bend, Indiana.
- Ohio Culvert Pipe Company, The, C. C. Carpenter, president; E. L. Hatcher, secretary.
- Ohio Road Machinery Company, The, W. A. Hensner, president; D. E. Graves, vice-president; C. H. Dudley, secretary-treasurer, Oberlin Lorain County, Ohio.
- Perfection Road Machinery Company, P. C. Thomas, president; J. H. Petri, vice-president; E. G. Hartel, secretary and manager; W. T. Resch, treasurer, Galion, Crawford County, Ohio.
- Power and Mining Machinery Company, The, Cudahy, Milwaukee County, Wisconsin.
- Port Huron Engine and Thresher Company, C. F. Harrington, president; F. A. Peavey, vice-president; D. C. Kinch, secretary; H. B. Hoyt, treasurer; A. E. West, general manager, Port Huron, Michigan (advertisement page 430).
- Pennsylvania Crusher Company (Inc.), Geo. W. Borton, president; Jos. L. Hiller, treasurer Wm. A. Battey, vice-president; H. M. Hallett, secretary, 1324 Stephen Girard Building, Philadelphia, Pennsylvania.
- Road Supply and Metal Company, (The), H. S. Putney, president; W. C. Stephenson, vice-president; F. L. Carswell, Secretary; H. S. Putney, manager, 15th and Santa Fe Tracks, Topeka, Kansas.
- Ruggles-Coles Engineering Company, Wm. B. Ruggles, president; Robt. G. McGann, vice-president; Lindsay R. Christie, secretary-treasurer, 50 Church Street, New York City.
- The Russell Company, J. W. McClymonds, president, C. M. Russell, vice-president; E. C. Merwin, second vice-president and secretary; Geo. H. McCall, treasurer, Massillon, Stark County Ohio.
- Russell Grader Manufacturing Company, E. E. Ellerston, president and manager; M. L. Elken, first vice-president; M. T. Nagle, second vice-president; C. O. Wold, secretary-treasurer, Minneapolis, Minnesota.
- Reeves and Company, (Inc.) M. T. Reeves, president and general manager; Fred Doeller, vice-president and treasurer; W. H. Haggard, second vice-president and sales manager; C. S. Way, secretary and purchasing agent; J. E. Kailor, superintendent; W. R. Baxter, collection manager, Columbus, Indiana.

- Syracuse Chilled Plow Company, Carlton A. Chase, president and treasurer; Wm. W. Ward, vice-president and secretary, Syracuse, New York.
- Smith and Sons Manufacturing Company, Wm. J. Smith, president; W. F. Smith, secretary-treasurer, Lexington and Guinette Avenues, Kansas City, Missouri.
- Sturtevant Mill Company, Thos. L. Sturtevant, president; William H. Ellis treasurer, Clayton and Park Streets, Boston, Massachusetts.
- T. L. Smith Company, T. L. Smith, president; C. F. Smith, vice-president; W. J. Buckley, secretary-treasurer, 1304 Majestic Building, 221 Grand Avenue, Milwaukee, Wisconsin.
- Standard Manufacturing Company, (not Inc.), Pliny E. Bassett, proprietor, Worcester, Massachusetts.
- Studebaker Corporation, J. M. Studebaker, president; Fredk. S. Fish, first vice-president; Clement Studebaker, Jr., general manager; J. N. Gunn, manager, automobile division and vice-president; Walter E. Flanders, vice-president; Geo. M. Studebaker, treasurer; A. R. Erskine, secretary; Scott Brown, general counsel, South Bend, Indiana.
- Sullivan Machinery Company, Frederk K. Copeland, president; J. Duncan Upham, treasurer; Albert Ball, mechanical engineer; Thos. W. Fry, secretary, Claremont, New Hampshire.
- Wm. P. Tarrant, Saratoga Springs, New York (advertisement page 445).
- Troy Wagon Works, Geo. R. McConnell, president; F. M. Chase, vice-president; C. T. Brown, secretary-treasurer; C. A. Geiger, general manager, Troy, Ohio.
- Univeral Road Machinery Company, Kingston, New York (advertisement page 439).
- Wood Brothers Thresher Company, F. J. Wood, president; E. E. Wood, vice-president; R. L. Wood, secretary-treasurer, Des Moines, Iowa.
- Western Wheeled Scraper Company, W. I. Babb, president; W. D. Foulke, treasurer; Frank C. Worthington, secretary, Aurora, Illinois.
- Watson Wagon Company, The, A. A. Keesler, president; C. M. Grouse, vice-president; Levi S. Chapman, secretary-treasurer, Canastota, Madison County New York.
- Williams Patent Crusher and Pulverizer Company, Milton F. Williams, president; Hoyt H. Green, vice-president; George E. Cottrill, secretary-treasurer; Edward H. Fricks, superintendent, 2701-23 North Broadway, St. Louis, Missouri.
- Wood Drill Works, Paterson, Passaic County, New Jersey.
- F. B. Zieg Manufacturing Company, (not Inc.), F. B. Zieg, proprietor, Frederick, Knox County, Ohio.

Manufacturers of Road Material

- American Tar Company, Chas. H. Tenney, president; Elihu A. Bradley, treasurer, 201 Devonshire Street, Boston, Massachusetts (advertisement page 445).
- Amies Road Company, Chas T. Eastburn, president; J. R. Gilkyson, secretary-treasurer, Drake Building, Easton, Pennsylvania (advertisement page 409).
- American Asphaltum and Rubber Company, J. T. Hill, president and manager; H. Rawston, vice-president; A. J. Hill, sales manager, 600-14 Harvester Building, Chicago, Illinois (advertisement page 410).
- J. D. Adams and Company, Indianapolis, Indiana (advertisement page 413).
- Barrett Manufacturing Company, Isaac D. Fletcher, president; Michael Ehert, vice-president and chairman of the board; William D. Childs, vice-president; S. H. Bingham, vice-president; P. S. Margaia, vice-

- president; A. T. Perry, vice-president; J. C. Runkell, vice-president; T. M. Rianhard vice-president; Ed. H. Wardwell, secretary; E. J. Steer, assistant secretary-treasurer; H. H. Philips, assistant treasurer, 17 Battery Place, New York City (advertisement page 418).
- Barber Asphalt Paving Company, Arthur W. Sewall, president; Avery D. Andrews, vice-president; James L. Rake, secretary, 19th Floor, Land Title Building, Philadelphia, Pennsylvania (advertisement page 416).
- Byerley and Sons, Frand A. Byerley, Cleveland, Ohio.
- Bituminized Road Company, Reliance Building, Kansas City Missouri.
- Rudolph S. Blome Company, City Hall Square Building, Chicago, Illinois.
- Birdsboro Stone Company, Charles A. Bergdoll, president; John M. MacBurney, general manager; E. C. Bergdoll, treasurer; Albert H. Hall, secretary, 614 Bulletin Building, Philadelphia, Pennsylvania (advertisement page 420).
- Central Westrumite Company, L. S. Van Westrum, president; G. S. Van Westrum, vice-president, treasurer and general manager; Francis Agnew, assistant general manager; J. H. Fowler, secretary, 2014 Fisher Building, 343 S. Dearborn Street, Chicago Illinois.
- Calcede Process Company, Sears Building, Boston Massachusetts.
- Dustoline for Road Company, John S. Lamson, Jr., president; Edwin R. Lamson, vice-president; Fred La Rowe, secretary; W. J. Lamson, treasurer, 93 Summitt Avenue, Summitt, Union County New Jersey.
- Dolarway Paving Company, 95 Libery Street, New York.
- Filbert Paving and Construction Company, Richard Y. Filbert, president; B. F. Richards, vice-president and secretary; David H. Ross, treasurer, 612 Pennsylvania Building, Philadelphia, Pennsylvania.
- Gulf Refining Company, Wm. Mellon, chairman of Board, C. H. Markham, president; H. A. Philips, vice-president; Richard B. Mellon, treasurer; Walter J. Guthrie, secretary, Pittsburg, Pennsylvania.
- Good Roads Improvement Company, Arthur Stem, president, First National Bank Building, Cincinnati, Ohio.
- Headley Good Roads Company, Wm. T. Headley, president; J. H. McNeal, secretary; A. C. Woodman, treasurer, 1631 Real Estate Trust Building, Broad and Chestnut Streets, Philadelphia, Pennsylvania (advertisement page 415).
- The Hastings Pavement Company, W. B. Flint, president; E. J. Morrison, general manager; O. A. Palmer, treasurer; C. P. Pultz, secretary, 25 Broad Street, Broad-Exchange Building, New York City (advertisement page 423).
- Indian Refining Company, Richmond Levering, president; B. W. Dudley, vice-president and treasurer; Newell H. Hargrave, secretary, 123 William Street, New York City.
- Impervious Product Company, Thos. J. McDonald, president; John A. Cronin, secretary-treasurer, Holliday and Fayette Streets, Baltimore, Maryland.
- Lima Construction and Supply Company, Delphos, Ohio.
- The Rocmac, Ltd., (Inc.), Edward A. Paterson, president, P. O. Box 641 N. Tonawanda, New York (advertisement page 436).
- Robeson Process Company, J. S. Robeson, president, Au Sable Forks, Essex County, New York (advertisement page 431).
- Standard Asphalt and Rubber Company, E. G. Leaszynsky, president; R. J. Dunham, vice-president; W. A. Levering, second vice-president; Norman Malcolm, secretary; E. C. Ennis, treasurer, 137 North La Salle Street, Chicago, Illinois (advertisement page 434).
- Sicilian Asphalt Paving Company, Howard Carroll, president; Harry Haggerty, secretary; George C. Clausen, treasurer, 41 Park Row and 12th Avenue and 54th Street, New York City.

- Solvay Process Company, Fredk. R. Hazard, president; Rowland G. Hazard, vice-president; L. O. MacDaniel, treasurer; Geo. E. Francis, secretary, Syracuse, New York (advertisement page 432).
- Alden Speare's Sons Company, Boston, Massachusetts.
- Standard Oil Company, of New Jersey, John D. Archbold, president; James A. Moffett, vice-president; A. C. Bedford, vice-president and treasurer; Walter C. Teagle, vice-president; Charles T. White, secretary; Frank Wilson, assistant treasurer; Henry Fisher, manager Road Oil Department, 26 Broadway, New York City (advertisement page 433).
- Sun Company, J. N. Pew, president, 1421 Chestnut Street, Philadelphia, Pennsylvania (advertisement page 436).
- Texas Company, The, J. S. Cullinan, president; E. C. Lufkin, vice-president; Arnold Schlaet, vice-president; L. E. Brooks, treasurer; Jas. L. Autry, secretary, Texas Building, Houston, Texas (advertisement page 437).
- Union Oil Company of California, Lyman Stewart, president; Wm. L. Stewart, first vice-president; J. S. Torrance, second vice-president; Robt. Watchorn, treasurer and assistant to the president; Giles Kellogg, secretary, Security Building, 5th and Spring Streets, Los Angeles, California.
- United Gas Improvement Company, Samuel T. Bodine, president; Randal Morgan, first vice-president and general counsel; Walton Clark, second vice-president; Lewis Lillie, third vice-president and treasurer; W. E. Douthirt, secretary, Broad and Arch Streets, Philadelphia, Pennsylvania.
- Uvalde Asphalt Paving Company, Ralph T. Tokeby, president; John D. Marston, treasurer; Frank Storrer, secretary, 1 Broadway, New York City, New York.
- Warren Chemical and Manufacturing Company, Thos. M. Rianhard, president; Fredk. M. Billings, secretary-treasurer, 17 Battery Place, New York City.
- Warren Brothers Company, Geo. C. Warren, president and general manager; Chas. W. Young, vice-president; J. M. Head, vice-president; Walter N. Warren, vice-president; John Dearborn, vice-president; Ralph H. Warren, treasurer; Perry B. H. Ward, assistant treasurer; Albert C. Warren, secretary, 59 Temple Place, Boston, Massachusetts (advertisement page 441).
- Wadsworth Stone and Paving Company, W. C. Thoma, president and general manager; J. A. Siedle, secretary-treasurer, Lambert Street and P. R. R. (A. F.), Pittsburg, Pennsylvania (advertisement page 443).
- U. S. Wood Preserving Company, 165 Broadway, New York.
- Warner-Quinlan Asphalt Company, Buffalo, New York.

Dealers in or Agents for Road Making Machinery

- Barron and Cole Company, James S. Barron, president, treasurer and general manager; Nelson C. Dennis, secretary, 127 Franklin Street, New York City.
- Harold L. Bond Company, of New York, Harold L. Bond, president; Howard C. Weaver, secretary-treasurer; Geo. S. Hedge, vice-president; 78-80 Bridge Street, New York City.
- Henry J. McCoy Company, Henry J. McCoy, president; Jas. W. McCoy, vice-president; John G. Wentink, treasurer; Frank E. Hall, secretary, 65 Dey Street, New York City.

National Paving Brick Manufacturers Association

Officers.—Charles J. Deckman, president, Cleveland, Ohio; J. W. Robb, vice-president, Clinton, Indiana; C. C. Barr, treasurer, Streator, Illinois; Will P. Blair, secretary, Cleveland, Ohio; H. H. MacDonald, assistant secretary, Cleveland, Ohio.

Purposes.—The National Paving Brick Manufacturers Association of this country was organized for the following purposes:

1. A dissemination among its membership of technical knowledge relating to the manufacture of their product.

2. To bring to the attention of the public the merits of Vitrified Brick as a paving material.

3. To influence to the greatest possible extent the proper construction of brick streets.

4. For furnishing truthful and reliable information regarding other paving materials, and their comparative value as pavements when considered with brick pavements.

Paving Brick Manufacturers

Alliance Clay Product Company, J. B. Wilcox, Alliance, Ohio.
 Albion Vitrified Brick Company, Ben L. Mayne, Albion, Illinois.
 Alton Brick Company, Eb. Rodgers, Alton, Illinois.
 Athens Brick Company, W. N. Alderman, Athens, Ohio.
 The Barr Clay Company, C. C. Barr, Streator, Illinois.
 Bessemer Limestone Company, C. C. Blair, Youngstown, Ohio.
 Big Four Clay Company, G. O. French, Canton, Ohio.
 Bloomfield Brick Company, C. E. Davis, Bloomfield, Indiana.
 Bolivar Face Brick Company, J. B. Hammond, Bolivar, Pennsylvania.
 Brick, Terra Cotta and Tile Company, M. E. Gregory, Corning, New York.
 Cleveland Brick and Clay Company, F. M. Brady, Cleveland, Ohio.
 Cleveland Vitrified Brick Company, E. B. Wentworth, Oklahoma City, Oklahoma.
 Clinton Paying Brick Company, J. W. Robb, Clinton, Indiana.
 Copeland-Inglis Shale Brick Company, B. A. Inglis, Birmingham, Alabama.
 Corry Brick and Tile Company, D. Warren D. Rosay, Corry, Pennsylvania.
 Danville Brick Company, N. P. Whitney, Danville, Illinois.
 Deckman-Duty Brick Company, C. J. Deckman; S. M. Duty, Cleveland, Ohio.
 Denny-Renton Clay and Coal Company, Seattle, Washington.
 Dunn Wire-Cut hug Brick Company, Conneaut, Ohio.
 Glenn-Gery Brick and Cement Company, W. A. Gery, Reading, Pennsylvania.
 Hankinson and Hagler, Augusta, Georgia.
 Hammond Fire Brick Company, T. I. Brett, Fairmont, West Virginia.
 Harris Brick Company, T. Lawson Moores, Cincinnati, Ohio.
 Indiana Paving Brick and Block Company, W. W. Winslow, Indianapolis, Indiana.
 Kentucky Vitrified Brick Company, M. J. Bannon, Louisville, Kentucky.
 Kushequa Brick Company, E. K. Kane, Kushequa, Pennsylvania.
 C. P. Mayer Brick Company, C. P. Mayer, Bridgeville, Pennsylvania.
 Marion Brick Works, Montezuma, Indiana.
 Medora Shale Brick Company, C. C. McMillan, Medora, Indiana.

Metropolitan Paving Brick Company, J. G. Barbour, Canton, Ohio.
 Murphysboro Paving Brick Company, W. H. Hill, East St. Louis, Illinois.
 McAvoy Vitrified Brick Company, 1345 Arch Street, Philadelphia, Pennsylvania.
 Nelsonville Brick Company, C. H. Doan, Nelsonville, Ohio.
 Newburgh Brick and Clay Company, J. R. Zmunt, Cleveland, Ohio.
 Peebles Paving Brick Company, F. L. Manning, Portsmouth, Ohio.
 Poston Paving Brick Company, J. M. Waugh, Crawfordsville, Indiana.
 A. F. Smith Company, P. A. Smith, New Brighton, Pennsylvania.
 Saginaw Paving Brick Company, J. H. Qualmann, Saginaw, Michigan.
 South Zanesville Sewer Pipe and Brick Company, J. C. Bolen, Jr., Zanesville, Ohio.
 Springfield Paving Brick Company, A. L. Converse, Springfield, Illinois.
 Sterling Brick Company, Olean, New York.
 Peter Stipp, Successor to Scranton Vitrified Brick Company, Scranton, Pennsylvania.
 Purington Paving Brick Company, Galesburg, Illinois.
 Streator Paving Brick Company, E. F. Plumb, Streator, Illinois.
 Shawmut Paving Brick Company, Alfred Yates, Shawmut, Pennsylvania.
 Terre Haute Vitrified Brick Company, J. M. Hoskins, Terre Haute, Indiana.
 Thomas Moulding Company, T. C. Moulding, Chicago, Illinois.
 T. B. Townsend Brick and Contracting Company, O. N. Townsend, Zanesville, Ohio.
 Thornton Fire Brick Company, D. R. Potter, Clarksburg, West Virginia.
 Trimble Brick Manufacturing Company, J. H. Simpson, Dayton, Ohio; Trimble, Ohio.
 United Brick Company, G. H. Francis, Greensburg, Pennsylvania.
 Wabash Clay Company, Veedersburg, Indiana.
 Wassall Brick Company, R. L. Lewis, Glouster, Ohio.
 Westport Paving Brick Company, John W. Hall, Baltimore, Maryland.
 Windsor Brick Company, J. T. Windsor, Akron, Ohio.
 Wooster Shale Brick Company, W. R. Barnhart, Jr., Wooster, Ohio.

Association of American Portland Cement Manufacturers

Officers.—Edward M. Hagar, President; president Universal Portland Cement Company, 72 West Adams Street, Chicago, Illinois. W. S. Mallory, vice-president; President, Edison Portland Cement Company, Stewartville, New Jersey. John B. Lober, Treasurer, President Vulcanite Portland Cement Company, Land Title Building, Philadelphia, Pennsylvania. Percy H. Wilson, Secretary; 1526 Land Title Building, Philadelphia, Pennsylvania.

Headquarters.—1526 Land Title Building, Philadelphia, Pennsylvania.

Objects.—To acquire and disseminate information concerning the best practice in the use of cement and concrete.

To raise the standards of construction.

To emphasize the necessity of careful attention to all details of construction and to the selection of such materials as will produce the best results.

To give to anyone requesting same, information they may desire on the proper use of cement and concrete.

Portland Cement Manufacturers

- Allentown Portland Cement Company, Allentown, Pennsylvania.
 Alma Cement Company, Wellston, Ohio.
 Alsen's American Portland Cement Works, 45 Broadway, New York, New York.
 Alpha Portland Cement, general offices, 10 Central Square, Easton, Pennsylvania.
 American Cement Company of New Jersey, Pennsylvania Building, Philadelphia, Pennsylvania.
 Ash Grove Lime and Portland Cement Company, R. A. Long Building, Kansas City, Missouri.
 Atlas Portland Cement Company, 30 Broad Street, New York, New York.
 Bath Portland Cement Company, Newark, New Jersey.
 California Portland Cement Company, Los Angeles, California.
 Castalia Portland Cement Company, Publication Building, Pittsburg, Pennsylvania.
 Cayuga Lake Cement Company, Ithaca, New York.
 Chicago Portland Cement Company, 30 N. La Salle Street, Chicago, Ill.
 Colorado Portland Cement Company, Denver, Colorado.
 Continental Portland Cement Company, St. Louis Missouri.
 Dewey Portland Cement Company, Scarritt Building, Kansas City, Missouri.
 Dexter Portland Cement Company, Nazareth, Pennsylvania.
 Diamond Portland Cement Company, Williamson Building, Cleveland, Ohio.
 Dixie Portland Cement Company, Chattanooga, Tennessee.
 Edison Portland Cement Company, Stewartsville, New Jersey.
 Fredonia Portland Cement Company, Fredonia, Kansas.
 German-American Portland Cement Works, La Salle, Illinois.
 Glens Falls Portland Cement Company, Glens Falls, New York.
 Great Western Portland Cement Company, Kansas City, Missouri.
 Helderberg Cement Company, 78 State Street, Albany, New York.
 Huron Portland Cement Company, Ford Building, Detroit, Michigan.
 Iola Portland Cement Company, Iola, Kansas.
 Iowa Portland Cement Company, Des Moines, Iowa.
 Louisville Cement Company, Speeds, Indiana.
 Michigan Portland Cement Company, Chelsea, Michigan.
 Nazareth Cement Company, Nazareth, Pennsylvania.
 New Aetna Portland Cement Company, Detroit, Michigan.
 Newaygo Portland Cement Company, Grand Rapids, Michigan.
 Norfolk Portland Cement Corporation, 604 Pennsylvania Building, Philadelphia, Pennsylvania.
 Northwestern States Portland Cement Company, Mason City, Iowa.
 Ogden Portland Cement Company, Ogden, Utah.
 Oklahoma Portland Cement Company, Ada, Oklahoma.
 Omega Portland Cement Company, Jonesville, Michigan.
 Peerless Portland Cement Company, Union City, Michigan.
 Peninsular Portland Cement Company, Jackson Michigan.
 Penn-Allen Cement Company, Allentown, Pennsylvania.
 Pennsylvania Cement Company, 29 Broadway, New York, New York.
 Phoenix Portland Cement Company, Nazareth, Pennsylvania.
 Portland Cement Company of Utah, Salt Lake City, Utah.
 Riverside Portland Cement Company, Los Angeles, California.
 Security Cement and Lime Company, Baltimore, Maryland.
 Southwestern States Portland Cement Company, Dallas, Texas.
 Standard Portland Cement Company, Charleston, South Carolina.

Standard Portland Cement Corporation, Crocker Building, San Francisco, California.

Superior Portland Cement Company, The, Cincinnati, Ohio.

Texas Portland Cement Company, Cement, Texas.

Tidewater Portland Cement Company, Baltimore, Maryland.

Union Sand and Material Company, Liggett Building, St. Louis, Missouri.

United Kansas Portland Cement Company, Iola, Kansas.

United States Portland Cement Company, Coors Building, Denver, Colorado.

Universal Portland Cement Company, 72 West Adams Street, Chicago, Illinois.

Virginia Portland Cement Company, 26 Beaver Street, New York, New York.

Vulcanite Portland Cement Company, Land Title Building, Philadelphia, Pennsylvania.

Wabash Portland Cement Company, Ford Building, Detroit, Michigan.

Western States Portland Cement Company, Jackson, Michigan.

Whitehall Cement Manufacturing Company, Land Title Building, Philadelphia, Pennsylvania.

Wolverine Portland Cement Company, Coldwater, Michigan.

National Lime Manufacturers Association

Officers.—William E. Carson, president, Riverton, Virginia; J. King McLanahan, Jr., first vice-president, Hollidaysburg, Pennsylvania; H. A. Buffum, second vice-president, Rockland, Maine; George J. Nicholson, third vice-president, Manistique, Michigan; Fred. K. Irvine, secretary, Chicago, Illinois; C. W. S. Cobb, treasurer, St. Louis, Missouri.

Executive committee.—William E. Carson, ex-officio, Riverton, Virginia; Charles Warner, Wilmington, Delaware; Walter S. Sheldon, Hamburg, N. J.

ROAD CONTRACTORS

The following names of road contractors were furnished by State highway departments, commercial organizations, road associations and public officials in the respective States.

Alabama⁵⁴

Bearden, A. F.....	Guin
Cook & Company, D. R.....	Selma
Goodrich & Crinkley.....	Anniston
Pruett, O. J.....	Montgomery
Wright, J. W., Jr.....	Brewton

Arizona

Cook, M. D. L.....	Little Rock ⁵⁵
Dalhoff Construction Company.....	Little Rock
Haben, E. J.....	Little Rock
Mahoney, J. J.....	Argenta
Hayes, Tom.....	Fort Smith ⁵⁶
Johnson, James D.....	Fort Smith
Peay, Nick.....	Little Rock
Shelby, I. P.....	Little Rock
Wallace, M. C.....	Fort Smith
Woodsmall & McCarthy.....	Little Rock
Drainage Association.....	

California⁵⁷

Bryant & Austin.....	Los Angeles
The City Street Improvement Company.....	San Francisco
The Clark & Henry Company.....	Stockton

Bridge Contractors

Healy Tibbetts Company.....	San Francisco
Mervy & Elwell.....	San Francisco
The Pacific Construction Company.....	San Francisco
The San Francisco Bridge Company.....	San Francisco

Colorado⁵⁸

The Acme Construction Company, 930 Bragdon Avenue.....	Pueblo
Bartels, F. 1626 Champa Street.....	Denver
Bates, E. B.....	Wiggins

⁵⁴ Names supplied by State highway department.

⁵⁵ Little Rock and Argenta names supplied by Arkansas Good Roads and

⁵⁶ Fort Smith names supplied by Judge W. A. Falconer.

⁵⁷ List supplied by State department of engineering.

⁵⁸ List supplied by State highway department.

Boulder Concrete Works.....	Boulder
Booth, Levi G., 231 Columbine Street.....	Denver
Browne, F. O., 1st and Larimer Streets.....	Denver
Burk & Vaughn.....	Castle Rock
Colorado Engineering & Construction Company.....	Greeley
Coleman, E. R.....	La Veta
Colorado-Utah Construction Company, Majestic Building.....	Denver
Commonwealth Construction Company, Colorado Building.....	Denver
Dawson, C. D.....	Olathe
Denver & Pueblo Construction Company, Railroad Building.....	Denver
Ford, Frank.....	Littleton
Fox & Smith Construction Company.....	Florence
Fox & Babb, 905 8th Avenue.....	Greeley
Gaffy & Keefe Construction Company, Exchange Building.....	Denver
Gittings, J. B.....	Walsenburg
Heimbecher, C. F., & Brother, 515 15th Street.....	Denver
Herst & Koenig.....	Sterling
Hess & Son.....	Manassa
Holme & Allen Pipe and Construction Company, McPhee Building, Denver.....	Denver
Jenican, Henry, 330 Temple Court.....	Denver
Jenkins & Branson.....	Las Animas
Johnson, J. W.....	Julesburg
Kelley, George A.....	Hotchkiss
Kenefick-Quigley & Russell Construction Company, Century Bldg., Denver.....	Denver
Keys, Mr.....	Idaho Springs
Kilpatrick Brothers Company, Railroad Building.....	Denver
Ladd-Sanger Contracting Company, Majestic Building.....	Denver
Larson, Chris.....	Hotchkiss
Marshall-Murphy Construction Company.....	Las Animas
Miller, George.....	La Junta
Morrison Constructing Company.....	Denver
Municipal Construction Company, Jacobson Building.....	Denver
Murphy, Hugh, Nassau Block.....	Denver
National Construction Company, Empire Building.....	Denver
Newell & Kaufman, Contractors, Emerson Street.....	Denver
Okumura, H. S., Railroad Building.....	Denver
Osner, Joseph, 357 Broadway.....	Denver
Patterson, M. J., Contracting Company, Colorado Building.....	Denver
Phillips Construction Company, Railroad Building.....	Denver
Pinno, J. E.....	Fort Morgan
Pueblo Bridge Company.....	Pueblo
Seerie Brothers, Continental Building.....	Denver
Sheeley, The C. G., Contracting Company, Tabor Opera House.....	Denver
Standard Construction Company, Central Block.....	Pueblo
Stocker & Fraser, Colorado Building.....	Denver
Whitney-Steen Company, Symes Building.....	Denver
Zook & Makin.....	Erie

Connecticut⁵⁹

Ahern Brothers.....	Willimantic
Anderson & O'Neil.....	East Hampton
Allen, T. J.....	Westerly, R. I.
Ambrisio, A. D., 609 Front Street.....	Hartford
Arthur, W. H.....	Stamford

⁵⁹ List supplied by State highway commissioner.

Arrigoni, F. & Brother.....	Middletown
Barbara, Joseph S.....	Stafford Springs
Benvenuti, Nazzatino, 72 Goshen Street.....	New London
Beaver Construction Company.....	Pittsfield, Mass.
Beard, Bennett N. Company.....	Shelton
Benedict, O. T.....	Pittsfield, Mass.
Bincho, Carlo.....	S. Framingfield, Mass.
Blakeslee, C. W. & Sons.....	New Haven
Brazos, Frank, 808 Elm Street.....	New Haven
Brazos, A. & Sons.....	Middletown
Bridge's A. D. Sons, Inc.....	Hazardville
Brown, A. B., Fr., 58 Water Street.....	Boston, Mass.
Brown, A. L.....	Bloomfield
Bruce, Lawrence.....	North Haven
Calandrillo, John, 163 Franklin Avenue.....	Hartford
Camineiro & Griano, 642 Bank Street.....	Waterbury
Cavanaugh, John.....	Portland
Callan, L. H., 208 Franklin Street.....	Bristol
Catto, E., 49 Jackson Place.....	Willimantic
Cellilli, G. L., 303 Water Street.....	Springfield, Mass.
Christiano, Joseph.....	Greenwich
Chislon, Dean L.....	Franklin, Mass.
Clarke, E. N.....	Milford
Connolly, Peter E., 70 Perkins Street.....	Boston, Mass.
Colgan, Daniel A., 343 Sherman Avenue.....	New Haven
Crowley, W. H., 309 Garden Street.....	Hartford
Curtiss, Clayton T.....	Glastonbury
Caley, Robert D., 313 Wallace Street.....	New Haven
D'Aloia, Joseph, R. F. D. No. 1.....	Waterbury
Donahue Brothers.....	Middletown
Douglas, A. E.....	Glastonbury
Ellis, Fred E.....	Melrose, Mass.
Fair, J. B.....	Shelton
Fabbri, Frank.....	Torrington
Farinelli Brothers.....	Hyde Park
Foley, T. F.....	S. Norwalk
Foster, Henry D., P. O. Box 869.....	New Haven
Gary Brothers.....	Stafford Springs
Gaffey, John A.....	Medford, Mass.
Gilbert, F. H.....	Jewett City
Gill, T. H., & Company, Winter Hill Station.....	Boston, Mass.
Giovannine, P. F. & Company, 424 Hanover Street.....	Boston, Mass.
Goodman, Louis J.....	Litchfield
Griswold, A. B.....	Stamford
Hatch, Charles B., R. F. D. No. 19.....	Danbury
Hadley Brothers Company.....	Peekskill, N. Y.
Hailey & Harris, 55 Remsen Building.....	Albany, N. Y.
Hall, George, care of T. F. Ley Company.....	Waterbury, Mass.
Horne, Charles E.....	Milbury, Mass.
Jenks & Goepfle.....	Wilton
Jones & Porcaro.....	Willimantic
Kearney, Thomas.....	Meriden
Kennedy, Roger.....	Middletown
Kerwin, John F., 109 Bank Street.....	Waterbury
Ketchen, A. J. & Son.....	Tarriffville
Lane Construction Corporation.....	Meriden
Ley, F. T., Company.....	Springfield, Mass.

McManus, Edward	Waterbury
McCormick, J.	East Providence, R. I.
McNamara, D. W., 100 South Street	Danbury
McCabe, William E., 26 State Street	Hartford
Mascetti & Holley	Torrington
Mague, Francis J.	West Newton, Mass.
Mahan, Bryan F.	New London
Mattee, Lorenzo J., 43 Carlisle Street	New Haven
Maloney, William, Quaker Lane	West Hartford
Merritt, L. F.	Stamford
Michiel, John de & Brother	Torrington
Milligan, A. G.	New Rochelle, N. Y.
New England Contracting Company, Bellevue Street	Worcester, Mass.
Nolan, Thomas J., 75 State Street	Boston, Mass.
Olmsted & Olmsted	East Hartford
O'Neil & Nero, 383 Front Street	Hartford
Osborn, H. Sanford	Redding Ridge
Pardee, E. G.	Bethany
Peck, E. W.	Stamford
Pierce, B. D., Jr., Company	Bridgeport
Pierson Engineering & Construction Company	Bristol
Ricco, George B., 921 Howard Avenue	New Haven
Rossi, Caesar A.	Torrington
Ryan, Thomas	Thompson
Shay, M. P.	New London
Shanley-Morrissey Company, 154 Nassau Street	New York, N. Y.
Strenli & Puckhafer	Bridgeport
Sterling, L. E.	Pawling, N. Y.
Sternbery & Cadwell	West Hartford
Suzio & Toner, or Leonardo Suzio	Middletown
Thomas, Charles H.	Middleboro, Mass.
Tracy, Edward B.	Derby
Tryon, C. W.	Meriden
Trumbull, Joseph S., 326 First Avenue	West Haven
Trout Brook Ice Company	Middletown
Vito, A., Construction Corporation	Thompson
Warner, W. V., R. F. D.	Waterbury
Williams, Gilbert, Jr.	Watertown
Wilcoz, William B.	Norwich
Wilson, Samuel W.	Wolcott
Young & Jenks	Waterbury

Delaware⁶⁰

Ambler-Davis Company, 14 S. Broad Street	Philadelphia, Pa.
Anderson, Joseph	Delaware City
Atlantic Refining Company, Bourse Building	Philadelphia, Pa.
Cocco, Antonio, Room 601 Fidelity Bldg.	Philadelphia, Pa.
Barber & Perring, Land Title Building	Philadelphia, Pa.
Borneman, F. W.	Lansdowne, Pa.
Borneman-Beitler Construction Company, Inc.	
	1317 Land Title Building Philadelphia, Pa.
Clark, John A., 603 W. 5th Street	Wilmington
Continental Public Works Company, 2 Rector Street	New York, N. Y.
Coreoran Construction Company	West Chester, Pa.

⁶⁰ List supplied by State highway commissioner.

Delaware Granite & Mining Company.....	Wilmington
Dodge, F. W., Company, 603 Chestnut Street.....	Philadelphia, Pa.
Doran, John F., 428 Marshall Street.....	Norristown, Pa.
Evans, W. C.....	Ambler, Pa.
Fisher, Riley & Carozza, 211 E. Fayette Street.....	Baltimore, Md.
Francis, J. D.....	Punxsatawny, Pa.
Frech, George M.....	Somerville, N. J.
Hanlon, John F. Company, Inc., 1335 Real Estate Bldg.....	Philadelphia, Pa.
Haigh, Arthur H., Post Office Building.....	Germantown, Pa.
Heddon, E. J., 14 S. Broad Street.....	Philadelphia, Pa.
Horrigan Contracting Company, Ford Building.....	Wilmington
Juniata Paving Company, Empire Building.....	Philadelphia, Pa.
McClellan, William.....	Strafford, Pa.
Monroe Paving Company, Stephen Girard Building.....	Philadelphia, Pa.
Moore, H. O., & Company, 407 Samson Street.....	Philadelphia, Pa.
Moore, H. P.....	Narberth, Pa.
Mundy, Patrick J., 9 E. 4th Street.....	Wilmington
Nelson-Merydith Company.....	Chambersburg, Pa.
Nolan Brothers.....	Reading, Pa.
O'Connell, D. E.....	Kennett Square, Pa.
O'Neal, John F.....	Mt. Cuba
Snyder, George F., Company, 129 S. 5th Street.....	Philadelphia, Pa.
Stewart & Donohue.....	Wilmington
Stewart, J. F., 55th and Walnut Streets.....	Philadelphia, Pa.
Walker, Joseph, 44 State Street.....	Albany, N. Y.
Wickersham, D. F.....	Kennett Square, Pa.
Williams, John J., & Company.....	Chester, Pa.

Florida

Baker, D. M.....	Jacksonville ⁶¹
Davis, R. L.....	Tampa ⁶²
Logan Concrete & Engineering Company.....	Jacksonville
Long, F. W., & Company.....	Jacksonville
Mattair & Young.....	Jacksonville
Merritt, C. W.....	Pensacola ⁶³
Paul, F. C.....	Tampa
Sherrill, T. B.....	Tampa
Wilson, J. Y.....	Jacksonville

Georgia

Bosworth, E. L.....	Rome ⁶⁴
Bowe, W. F.....	Augusta ⁶⁵
Dorn & Williams.....	Augusta
Georgia Engineering Company.....	Augusta
Grafton, T. E.....	Rome
Gardiner & Pease.....	Columbia ⁶⁶
Hankinson & Hagler.....	Augusta
Mitchell, W. H.....	Rome
Twiggs, A. J. & Son.....	Augusta

⁶¹ Jacksonville names supplied by board of trade.

⁶² Tampa names supplied by board of trade.

⁶³ Pensacola name supplied by Commercial Association.

⁶⁴ Rome name supplied by Manufacturers and Merchants Association.

⁶⁵ Augusta name supplied by chamber of commerce.

⁶⁶ Columbia name supplied by board of trade.

Illinois⁶⁷*Road Contractors*

Beckelheimer, W. T.....	Carmi
Dunlap, O. M.....	Edwardsville
Feutz, Edward.....	Highland
Oil Roads Construction & Engineering Company, Ferguson Bldg.,	Springfield

Bridge Contractors

Advance Construction Company.....	Waukesha, Wis.
American Bridge Company, Monadnock Building.....	Chicago
American, The, Bridge Company, 40 Dearborn Street.....	Chicago
Arentz, F. C. H., 627 Western Avenue.....	Joliet
Bayne, W. M., 7534 Union Avenue.....	Chicago
Bender, G. J., Son & Company.....	Galena
Bilmire, M. M.....	Ashton
Blodgett, A. M., 1012 Commerce Building.....	Kansas City, Mo.
Bresee & Brown.....	Mattoon
Brucker & Granitoid Company.....	Alton
Bruene, Earnest, Jr.....	Dorsey
Burnham & Ives, Greisheim Building.....	Bloomington
Cameron, McManus & Joyce.....	Keokuk, Iowa
Central States Bridge Company, 601 Beecher Street.....	Indianapolis, Ind.
Challacombe, J. R.....	Hillsboro
Chester, Charles.....	Shelbyville
Clinton Bridge & Iron Company.....	Clinton, Iowa
Concrete Steel Construction Co., 1100 W. Washington St....	East Peoria
Continental Bridge Company, 557 Monadnock Building.....	Chicago
Corrugated Bar Company, 927 Monadnock Building.....	Chicago
Davis Ewing Concrete Company.....	Bloomington
Deason, Edward.....	DeSoto
Decatur Bridge Company.....	Decatur
Dodge, F. W., & Company, 842 Monadnock Building.....	Chicago
Eli Bridge Company.....	Roodhouse
Empire Construction Company, Stock Exchange Building.....	Chicago
Falkenau Electrical Construction Company, 201-3 Stock Exchange Building.....	Chicago
Fish, L. E.....	Shelbyville
Fitsche Brothers.....	Washburn
General Engineering Company.....	Rockford
Goss Brothers.....	Belleville
Griffiths Iron Works, 23d and Papin Streets.....	St. Louis
Hackedorn, The Construction Co., 122 East Ohio St....	Indianapolis, Ind.
Hough, William B., Monadnock Building.....	Chicago
Hogo, O. K.....	Whitewater
Hyton, G. R.....	Edwardsville
Independence Construction Company, 301 Land Building.....	Davenport
Illinois Bridge Company, 1532 Monadnock Building.....	Chicago
Illinois Bridge Company.....	Sullivan
Illinois Gravel Company.....	Buda
Illinois Steel Bridge Company.....	Jacksonville
Interstate Iron & Steel Co., First National Bank Bldg.....	Chicago
Jackson, George W., Inc., 175-9 W. Jackson Building.....	Chicago
Janson & Zoeller.....	Pekin

⁶⁷ List supplied by State highway department.

Joliet Bridge Company.....	Joliet
Joliet Steel Construction Company.....	Joliet
Kennicott Water Softener, Chicago Heights.....	Chicago
Klein, Joseph.....	Freeburg
Lawson, C. P.....	Orion
LaFayette Engineering Company.....	LaFayette, Ind.
Lesch, H. & Company.....	Washburn
Loesch, Paul.....	Red Bud
McManus & Son.....	Princeton
Maddox & Whitlock.....	Fillmore
Mercer, Victor S.....	LaMoille
Midland, The, Bridge Company, 660-3 Gibraltar Bldg.....	Kansas City, Mo.
Minton, H. M.....	Carlinville
Missouri Bridge & Iron Company, 1000 Fullerton Bldg.....	St. Louis, Mo.
Neumann & Schuette.....	Bethalto
Parker, Thatcher A.....	Terre Haute, Ind.
Pfaff, Julius.....	Frankfort
Quade, H. C., 1414 Thirteenth Street.....	Moline
Roney, W. H., 557 Monadnock Building.....	Chicago
Sabin, J. H., 506 Trust Building.....	Rockford
Schlachter, Philipp.....	Streator
Schwartz, D. H., & Sons.....	Galesburg
Schmitt, The, Construction Company, Y. M. C. A. Building.....	Peoria
Schnable & Quinn, 1037 Stock Exchange Building.....	Chicago
Shons, W. H.....	Freeport
Sleezer, E. B.....	Millbrook
Springfield Bridge Company.....	Springfield
Steelcrete Construction Company, 3444 LaSalle Street.....	Chicago
Steer, Elon.....	Wyoming
Suhre, William.....	Alhambra
Thompson, A. D., 101 Y. M. C. A. Building.....	Peoria
Tremont Bridge & Iron Company, 224 Masonic Temple.....	Peoria
Turner, W. E.....	Harlem
VanDeusen & Turner.....	Keokuk, Iowa
Vincennes Bridge Company.....	Vincennes, Ind.
Wallingford, L. S.....	Prophetstown
Wever, C. A.....	Clayton
Western Concrete Bridge Co., 652 First National Bank Bldg.....	Chicago
Wetherell, H. S.....	Morgan Park
Wiegert Construction Company.....	Bushnell
Woodward, I. L., 621 LaSalle Street.....	Ottawa

Bidders on Steel Bridges

Attica Bridge Company.....	Attica, Ind.
Des Moines Bridge & Iron Co., 9th and Tuttle Sts.....	Des Moines, Ia.
Elkhart Bridge & Iron Company.....	Elkhart, Ind.
Indiana Bridge Company.....	Muncie, Ind.
Linder, H. H.....	Centralia
Loew Manufacturing Company, Madison Avenue and W. 90th Street N. W.....	Cleveland, Ohio
Michelman Construction Company.....	Quincy
Milwaukee Bridge Company.....	Milwaukee, Wis.
Modern Steel Bridge Company.....	Waukesha, Wis.
Pan-American Bridge Company.....	New Castle, Ind.
Penn. Bridge Company.....	Beaver Falls, Pa.
Skobis Brothers, 951 30th Street.....	Milwaukee, Wis.

Stupp Borthers Bridge & Iron Company, 304 Frisco Bldg...St. Louis, Mo.
 Toledo-Massillon Bridge Company.....Toledo, Ohio
 Wisconsin Bridge Company.....Milwaukee, Wis.
 Worden-Allen Company, 115 Adams Street.....Chicago

Indiana⁶³

A. E. & W. Construction Company.....Evansville
 Ackerman, Jacob.....LaPorte
 Ackerman, Jack & Company.....LaPorte
 Ackerman & Runyan.....Valparaiso
 Addington & Huffman.....Bluffton
 Addington, A. P.....Bluffton
 Adams Brothers Contracting Company.....Zanesville
 Adam, John.....Lebanon
 Albertson, George M.....Orleans
 Allison, Otis.....State Line
 Alexander & Crosbie.....Bluffton
 Atinchfield, Reichert & Saunders.....Evansville
 Ayers Construction Company.....Anderson
 Barnard, E. E.....Delphi
 Barnes & Gruel.....Logansport
 Barnes & Son.....Logansport
 Baker, B. B.....Monticello
 Baxatan, Henry.....Orleans
 Bears, L. O.....Linn Grove
 Beal & Bell.....Logansport⁶⁹
 Bedford & Nugent.....Evansville⁷⁰
 Big Four Crushed Stone Company.....Ibgalls
 Billings, C. W.....Flora
 Bolin, Hines.....Tipton
 Bobe, William.....Vincennes
 Booker & Davis.....Tipton
 Boucher & McCord.....McCordsville
 Brochsmith, William L.....Freelandville
 Brown, William.....Avoca
 Brooks Construction Company, 227 Shoaff Building.....Ft. Wayne⁷¹
 Bradfield, Seth.....Rockville
 Burke Brothers.....Anderson
 Burton, W. D.....Orleans
 Burk, T. J., & H. F.....New Castle
 Buell, Marchall.....Rushville
 Burk Brothers.....LaFayette
 Carmichael, Thomas C.....Aurora
 Campbell & Ramsey.....Lagro
 Carpenter, H. A.....Cloverland
 Carsons, David.....LaFayette
 Carrithers, E. I.....Fairbanks
 Carter & Vinzant.....Bainbridge
 Carty, W. G.....Montezuma
 Cadle, George.....Paoli
 Cannon, Isaac.....Loogootee

⁶³ List supplied by State Good Roads Association.

⁶⁹ Logansport names supplied by Logansport Commercial Club.

⁷⁰ Evansville names supplied by Evansville Business Association.

⁷¹ Ft. Wayne name supplied by Commercial Club of Fort Wayne.

Cain, Arthur T.	Vincennes
Clark, Scott	Flora
Clark, W. D.	Bedford
Clark, N. R.	Heltonville
Conner, J. C.	Delphi
Coz, Ira	Elnora
Cornet, Nicholas	Lawrenceburg
Conover & Taber	Valparaiso
Cond, Jas.	Kentland
Collins, Alfred	Paoli
Colter Brothers	Rushville
Coleman, Ephraim	LaFayette
Conover & Taber	Wabash
Crosbie & Johnson	Bluffton
Crane, W. W.	Marshfield
Crabb & Campbell	Brazil
Cunningham, Robert	Brook
Curran, J. F.	Greencastle
Davidson, Rufus	Malotte
Davis, George I.	Seymour
Daines, Isaac	Vincennes
Daniels, Lyst & Company	Anderson
Dawson, Alex.	Shoals
Day, A. G.	Roachdale
Day, John A.	Monticello
Defrees, C. H.	South Bend ⁷²
Demass, Ray	Chesterton
Delisle, John E.	Vincennes
DeGolyer, James	Seymour
Dorsett, Hardin	Huron
Eddleman, A. M.	Marengo
Emsweller & Jackson	Connersville
Engle, Eli	Monroe
Erie Stone Company	Huntington
Everhart, D. E.	Sullivan
Ewbank & Ewbank	Kingman
Fatout, D. H.	Indianapolis
Ferguson, A.	Valley Mills
Fillian, Jacob	Bloomington
Fitzpatrick Brothers	Harmony
Foulkes Contracting Company	Terre Haute
Folger, C. W. & Company	Columbia
Free, Nathaniel A.	Anderson
Frey, M. F.	LaFayette
Gaby & Cunningham	Linton
Gassaway, Robert	River Vale
Gano, Stephen A.	Mt. Vernon
Gettinger, J. W.	Meron
Geraghty, Thomas	Rushville
Gibson, N. C.	Idaville
Gibbens, L. W. & Son	Saline City
Gillian & Company	Bloomington
Glynn, Thomas	Terre Haute
Glynn, J. E.	Terre Haute
Godfrey, Louis W.	Seymour

⁷² South Bend name supplied by Chamber of Commerce.

Goff, Benjamin W.	Tipton
Gordon, W. S.	Liberty Center
Grannan, Virgil	Montgomery
Gray, Albert	Wadena
Greens & Hardie	Anderson
Greenwood & Conner	Connerville
Girton, Taylor	Logansport
Hall, Joseph	Logansport
Hall, A. B.	Mitchell
Hanawalt, M. J.	Monticello
Harding, W. S.	Crawfordsville
Harney, J. F.	Rockville
Hardin, J. A.	Pendleton
Hawkins Brothers	Brazil
Hawkins, Harvey	Brazil
Hawkins, Ward	Sullivan
Hayes & Waymire	Independence
Hayes, West & Karstster	Moore's Hill
Hayes, Isaac	Lawrenceburg
Heeter, J. G., & Company	Servia
Hendricks, E. W., & Company	Bedford
Hesher, Abe	Bluffton
Herriman, Alva E.	Brook
Hermauce & Green	Valparaiso
Herkless, Ora	Rushville
Hines, Frank	Muncie
Hiatt & McMahan	Plainfield
Hinkle, W. J.	Monon
Hinderleider	Medors
Hipskind, Al. F.	Wabash
Hitzell & Wolfcale	Markle
Holleran & Haverstick	Noblesville
Hoffman, William H.	LaFayette
Hoffman & Addington	Warren
Hoover, Alonzo	Wabash
Hopkins, James F.	Montgomery
Horral, Lon	Washington
Howe, Gus, 318 9th Avenue	Evansville
Huchinson, William B.	Michigan City
Hull & Hull	Summitville
Hunckler, John	Vincennes
Hurst & Sweet	Greencastle
Hutsell & Wolfcale	Markle
Hyman, Bert	Logansport
Ingram, W. T.	Jeffersonville
Ireland, Charles	Montezuma
Ireland, W. E.	Bloomington
Jackson & McCarty	Liberty Center
Jean & Snyder	Petersburg
Jenkins, Joseph	Vincennes
Johnson, Elwood	Orleans
Johnson, John M.	Noblesville
Johnson, Alex	Shoals
Johnson Brothers	Orleans
Jones, Herbert F.	Vincennes
Justice, Frank	Logansport
Keegan Brothers	Brazil

Kellenburger, G. A.	Reynolds
Kennedy, E. L.	Rushville
Kent, L. T.	Brookston
Kelleher & Company	Frankfort
Kitley & Hick	Urbana
Kivett, Levi	Bippus
Klyla Construction Company	Tipton
Krueger, Fred	Freelandville
Kutter & O'Donnell	Washington
Laswell, Tobe, 900 W. Pennsylvania Street	Evansville
Landis & Wilson	Huntington
Lanagan, James	Brazil
Lauck, John & Sons	Indianapolis
Layton, Harrie	Noblesville
Lanahan, P. W.	Vincennes
Little, James M.	Indianapolis
Lintz Brothers	Fort Branch
Lisby, A. M.	Coatsville
Long, Francis	Lebanon
McAndrew, James F.	Vincennes
McForman	Pilot Knob
McGeehee, Mathew	Washington
McGreevy Brothers	Logansport
McGreevey, C. J., & Son	Wabash
McKim, Thomas	Lawrenceburg
McKnight, Joseph	Shoals
McHale, Martin	Logansport
Mackey & Duckmiller	Marion
Madison Construction Company	Anderson
Mahoney & Allen	Greencastle
Mahoney & Cox	Greencastle
Markle Stone Company	Markle
Manion, Dempsey	Seymour
Mason, John B.	Alexandria
Meyer, Fred, Jr.	Corland
Miles, Franklin D.	Mays
Miller, George T.	Lebanon
Mortiz, Chris	Seymour
Mt. Vernon Construction Company	Evansville
Musselman, Frank	Newberry
Musselman, D. L.	Owasco
Modlin, H. C. & Company	Marion
Nash, Charles	Bluffton
Neff, J. N.	Bluffton
Neville, William S.	Montmorenci
Neese & Company	Franklin
Noble, S. A.	Bellmore
Norman, Walter	Heltonville
Nowlin, Ferris & Sons	Lawrenceburg
Nowlin, R. J.	Lawrenceburg
Nowling, V. B.	Rockville
Novinger & Hyman	Logansport
Novinger, John	Logansport
O'Conner Brothers	Crawfordsville
O'Donnell, James M.	Vincennes
O'Leary, Edward H.	Montmorenci
O'Neil, Thomas F.	Jeffersonville

Parlon, James	LaFayette
Palmer, Geo.	Logansport
Perkins, Oscar	Elmora
Pell & Johnson	Brazil
Pickens, W. E.	Cloverdale
Pierce, James T.	Delphi
Pierce James F.	Delphi
Platter, Peter	Rockville
Pollert, August	Vallonia
Reason, J. D., & Company	Pendleton
Reed & Thompson	Greensburg
Reed, Frank	Liberty Mills
Ridgway, Charles	Carlisle
Rochester Bridge Company	Rochester
Rogers, John E.	Vincennes
Ruehmann, Aug., 308 E. Columbia Street	Evansville
Roskoski, F. P.	Flora
Ruble, W. E.	Frichton
Ryan & Son	Anderson
Sammons, H. L.	Kentland
Scott, John W.	Ingalls
Scott, John W.	Aurora
Schroeder, Frederick E.	Dillsboro
Schuman, Albert J.	Dillsboro
Sheehan, Edward	LaFayette
Shahan & McCarthy	Lebanon
Shattuck, A. M.	Brazil
Schauwecker, Edgar J.	Clay City
Shively, Willet	Odon
Shuck, W. S.	Corydon
Shutt, L. A.	Huntington
Sewell, George M.	Ijamsville
Simmons, Oren J.	Marion
Small, Bert	Marion
Smith, W. F. & Company	Rensselaer
Smith, Ed. F.	Clinton
Smith, Bert & Roy Pierce	Zionsville
Smith & Company	Rensselaer
Smith, M. F.	Huntington
Smallwood, Samuel B.	Ewing
Snyder & Barnett	Frankfort
Sonntag, E. F.	Evansville
Stevens, Amos U.	Rushville
Standish, Miles	Bedford
Steele, Charles	Alexandria
Steigely, William A.	LaPorte
Sparks, Earl	Kirklin
Sutton, W. B.	Clay City
Sullivan, Mason & Sullivan	Alexandria
Sweeney, W. O. Company	Jeffersonville
Sykes, George W.	Newport
Taggart, W. W. & J. H.	Charlestown
Taylor, Sam	Vincennes
Thomas, H. A.	Flora
Thompson, W. S.	Delphi
Thompson, W. O.	Pine Village
Thurston, Elmer	Alexandria

Todd, The, Construction Company.....	Lagro
Turner, D. P.....	Kirklin
Turley, O. P.....	Orleans
Tyler, Clint.....	Marshfield
Vanfossan, J. P.....	Rockville
Vernmillion, Davis.....	Anderson
Vollmer, Edward.....	Decker
Wagner, Henry H.....	Huntington
Wales & Saxon.....	Converse
Walker, Sigle L.....	Alexandria
Waynick, A. L.....	French Lick
Ware, Ed. A.....	Bluffton
Weaver, Philander.....	Carthage
Weathers & Case.....	French Lick
Weaver, Jacob.....	Bedford
Wild & Company.....	Rushville
Wilkinson, W. W.....	Rockville
Williams, Jesse.....	Wheatland
White, Hiram F.....	Carthage
Weikel, Adam., 1120 Upper 8th Street.....	Evansville
Whithead, Bennett 519 Monroe Avenue.....	Evansville
Woods, W. W.....	Burnettsville
Woodward Brothers.....	Ossian
Woodward, George.....	Bloomington
Worden, N. P.....	State Line
Young, John B.....	LaPorte

Iowa⁷³

Clinton Bridge & Iron Works.....	Clinton
Des Moines Structural Steel Works.....	Des Moines
Federal Bridge Company.....	Des Moines
Gould Construction Company.....	Davenport
Iowa Bridge Company.....	Des Moines
Marsh Engineering Company.....	Des Moines
Miller-Hey Construction Company.....	Waterloo
Ottumwa Bridge Company.....	Des Moines
Ottumwa Supply & Construction Company.....	Ottumwa

Kansas⁷⁴

Road Constructors

Acme Paving Crusher Company.....	Kansas City
Bennett, M. I.....	Leavenworth
Bowesman, D. P.....	Rosedale
Davidson Construction Company.....	Independence
Dobbins Roads & Construction Company.....	Pleasant Hill
Kelly, J. D.....	Overland Park
Petty, J. H.....	Paola
Ransom & Cook.....	Ottawa
Turner, Archie M.....	Rosedale

⁷³ List supplied by State highway department.

⁷⁴ List supplied by State highway department.

Bridge Contractors

Beatty Contracting Company.....	Blair, Nebr.
Blynn, D. H.....	Fredonia
Capital Iron Works.....	Topeka
Dailey & Beckelheimer.....	Carmi, Ill.
Deldine, E. L.....	Hannibal, Mo.
Deikmann, A. A., Box 173.....	Oskaloosa
Dill, Roy.....	Manhattan
Freeborn Engineering & Construction Co., Scarrit Bldg.	Kansas City, Mo.
French, W. L.....	Kansas City, Mo.
Green, R. R.....	El Dorado, Ill.
Illinois Steel Bridge Company.....	Kansas City, Mo.
Kansas City Bridge Company, Water Works Bldg.....	Kansas City, Mo.
Leavenworth Bridge Company.....	Leavenworth
Marsh Bridge Company, 802 Equitable Building.....	Des Moines, Ia.
Midland Bridge Company, Gibraltar Building.....	Kansas City, Mo.
Missouri Valley Bridge Company.....	Leavenworth
Missouri Bridge & Iron Company.....	St. Louis, Mo.
Monarch Construction Company.....	Falls City, Nebr.
Moore, J. D., Contracting Company.....	North Topeka
Olson & Schmidt.....	St. Joseph, Mo.
Ottumwa Bridge Company.....	Ottumwa, Ia.
Smith, Marion.....	Durham
St. Louis Bridge & Iron Company.....	St. Louis, Mo.
Stupp Brothers.....	St. Louis, Mo.
Topeka Bridge & Iron Company.....	Topeka
Union Bridge & Construction Company.....	Kansas City, Mo.
Vincennes Bridge Company.....	Muskogee, Okla.
Williams, W. W., Civil and Consulting Engineer.....	Joplin, Mo.
Western Bridge & Construction Company.....	Omaha, Nebr.
Wheeler, W. W.....	Iola

Kentucky⁷⁵

Lexington Construction Company.....	Lexington
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Louisiana⁷⁶

Alexander, L. F., Audubon Building.....	New Orleans
Anderson, John.....	Gulfport, Miss
Barrow, B. F.....	Marganza
Bettevy, M.....	Marksville
Bowers, The Southern Dredging Company.....	Galveston, Texas
Bowels & Kemingway.....	Jackson, Miss.
Brady, E. P., Macheca Building.....	New Orleans
Bush, W. B., care of F. Hargrave Company.....	Helena, Ark.
Buras, J. L.....	Buras
Cavet, W. R., P. O. Box 312.....	Shreveport
Cheshire, R. L., 852 Dixon Avenue.....	Memphis, Tenn.
Clark, R. T.....	Natchez, Miss.
Comerford, W. J., 427 Pennsylvania Street.....	New Orleans
Conrad, George H., 5005 Dauphine Street.....	New Orleans
Constant, Francis T., P. O. Box 220.....	Alexandria

⁷⁵ Name supplied by Lexington Commercial Club.⁷⁶ List supplied by board of State engineers.

Codifer, J. S.	Fort Adams, Miss.
Cullen, M.	Fort St. Phillip
Craven, J. A., & Company, 913 Hibernia Building.	New Orleans
Dalgram, L. M., 218 Barronne Street.	New Orleans
Donaven & Daley	Lake Providence
Doullut & Williams, Maison Blanche	New Orleans
Egan, Thomas, 4330 Canal Street	New Orleans
Epple, George	Shreveport
Favret, L. F., 311 Barronne Street.	New Orleans
Foster, J. G.	Bayou Goula
Frey, N., 1031 Decatur Street.	New Orleans
Garbish, H. F.	Vicksburg, Miss.
Garig, George W.	Baton Rouge
Garsaud, Marcel, 2106 Tulane Avenue.	New Orleans
Gibson, O. A.	Natchez, Miss.
Glassell Brothers.	Belcher
Grasser Contracting Company, 912 Hennen Building.	New Orleans
Heard, W. W.	Baton Rouge
Hearin, D. B.	Baton Rouge
Helgason Brothers.	Vicksburg, Miss.
Helperin & Nattin Construction Company.	Shreveport
Hedberg, Herman, 4602 Perrier Street.	New Orleans
Hicks Company	Shreveport
Hunt, M.	Shreveport
Hunter, S. S.	Shreveport
Huth Dredging Company	Franklin
Ivey, D. E.	Mer Rouge
Jackson, C. S.	Crowley
Jahncke Nav. Company, Howard Avenue.	New Orleans
Keegan, John J. Sons, 2824 Magazine Street.	New Orleans
Kelley, George B., Tulane and Hagan Avenue.	New Orleans
Lacey Brothers	Arkansas City, Ark.
Lawrence Brothers.	Rohwer, Ark.
Linnan, M. L.	Baton Rouge
Lyons, P. H.	Nairo
McGinnis, Irwin.	Alexandria
McHie, R. H.	Greenville
McKittrick, W. S., 1823 N. 11th Avenue.	Nashville, Tenn.
McManus Brothers.	Eros
Martin, Charles J., 1544 Allen Avenue.	Shreveport
Mendelson, Charles, 339 Carondelet Street.	New Orleans
Mitchell, M., 1400 Tulane Avenue.	New Orleans
Mullen, W. C.	Vicksburg
Muse, T. E.	White Castle
Nattin, J. H.	Belcher
Newman & Wilds.	Venneer
Nicholson, Robert.	Lake Providence
North Louisiana Construction Company.	Benton
Patterson, A. L.	New Orleans
Parker, A. E.	Vicksburg
Perrilliat, Arsene, 1007 Hibernia Building.	New Orleans
Peterson, O. F. Sons & Company, 14 South Canal St.	New Orleans
Picou, Wallace.	McCall
Pratti, N., 2817 Onzaga Street.	New Orleans
Pritchard, W. H. & Company.	Natchez, Miss.
Reynolds, Hampton, 7823 Birch Street.	New Orleans
Roger, F. F., Grant Parish	How Cott

Rushing, W. M.	Bayou Current
Ryan, J. E., 4218 Iberville Street	New Orleans
Sessions, John G.	Van Buren, Ark.
Scott, John & Sons, Times Building	St. Louis, Mo.
Scott, N. G., Hennen Building	New Orleans
Shields, T. S.	Greenville, Miss.
Smith, C. D. & Company, 1014 Memphis Trust Bldg.	Memphis, Tenn.
Teche, The Transportation & Fuel Company	Franklin
Thomas, A. J., 208 Hibernia Building	New Orleans
Williamson, Norris	Milliken
Wimbish, C. D.	Shreveport
Wyatt, W. A.	Natchez, Miss.

Maine⁷⁷

Adams, Edward	North Andover
American Truck Company	Kittery
Benedict, O. T.	Pittsfield
Berg, John A., Box 335	Brownville
Bryne, George M., & Company, 70 Milk Street	Boston, Mass.
Carchia, L. C., 158 Salem Street	Boston, Mass.
Cinadella Brothers Company	Milford, Mass.
Clifford, John D.	Lewiston
Coleman Brothers, corner Pearl and Marginal Streets	Chelsea, Mass.
Coleman, J. C., & Sons, 1620 Tremont Street	Roxbury, Mass.
Collan, L. H.	Bristol, R. I.
Commonwealth Construction Company, Times Bldg.	New York, N. Y.
Cressey, Walter, 178 Western Avenue	Gloucester, Mass.
Desantis, P.	Presque Isle
Doherty, James, 133 Calumet Street	Roxbury, Mass.
Ellis, Fred E.	Melrose, Mass.
Fernald, George N., 1642 Forest Avenue	Woodfords
Gaffey, John A.	Medford, Mass.
Gill, John F., 92 Bonair Street	Winter Hill, Mass.
Gill, T. H. & Company	Winter Hill Station, Mass.
Goodwin, Roy C.	South Berwick
Gulliver, John W., 120 Exchange Street	Portland
Horne, Charles E.	Milbury, Mass.
Hudson, R. F., 19 Whittier Street	Melrose, Mass.
Lane Construction Corporation, 37 Colony Street	Meridan, Conn.
Ley, Fred T., Construction Company	Springfield, Mass.
Long, Joseph, & Company	Leominster, Mass.
Lord, Edgar I.	Bar Harbor
McBride, H. M., 10 Winship Street	Brighton, Mass.
McGanley, M. J., 2029 Columbia Avenue	Boston, Mass.
Magur, F. G.	West Newton, Mass.
Marciano, Darena & Company, 24 Battery Street	Boston, Mass.
Monroe Paving Company, Betz Building	Philadelphia, Pa.
Moore, E. F.	Burlington, Vt.
Mullen, Luke D., 166 Devonshire Street	Boston, Mass.
Murray, Charles	Houlton
New England Construction Company, 3½ Bellevue St.	Worcester, Mass.
Northeastern Paving & Construction Co., Court Square Bldg.	Portland
Nowell, Jas. C.	Franklin, N. H.
Polcaro, John W.	Pittsfield, Mass.

⁷⁷ List supplied by State highway department.

Reed, Stewart & Blunt.....	Skowhegan
Rourke, E. J.....	Abington, Mass.
Rowe Construction Company.....	Melrose, Mass.
Shanahan, R. D.....	Portland
Shawmut Construction Company.....	Boston, Mass.
Simpson, D. J., & Company.....	Olamon
Simpson Brothers Corporation, 166 Devonshire Street.....	Boston, Mass.
Smith & Walker.....	Kennebunkport
Snow & Farrington.....	Wrentham, Mass.
Stuart, T., & Sons Company, 22 Pearl Street.....	Newton, Mass.
Sullivan, J. H.....	Brighton, Mass.
Susi, D. M.....	Pittsfield
Thomas, Charles H.....	Middleboro, Mass.
Tuttle, H. S., & Company.....	Lynn, Mass.
Watkins, James E.....	Amesbury, Mass.
Welch, T. F., 61 Gardner Street.....	West Roxbury, Mass.
Wellman, L. L., 95 Sewall Street.....	Augusta
Willey, Clifford M.....	Bar Harbor
Winslow, O. F., Hotel Arlington.....	Haverhill, Mass.
Worcester Broken Stone Company.....	Worcester, Mass.

Maryland⁷⁸

Andrews, S. S.....	Cambridge
Ault, D. V., Room 60, Knickerbocker Building.....	Baltimore
Barrett, T. J.....	Bordentown, N. J.
Bennett, M., & Sons, 436 Oak Street.....	Indiana, Pa.
Brown, E. W.....	Port Deposit
Caroline Construction Company, P. O. Box 69.....	Preston
Coblentz & Klipp.....	Frederick
Connolly, P. F., 70 Perlsins Street, Jamaica Plains.....	Boston, Mass.
Duvall, F. M.....	St. Margaret
Elder, W. M., St. Paul Street.....	Baltimore
Evans, W. C.....	Ambler, Pa.
Fisher & Carozza, 613 American Building.....	Baltimore
Flanigan, P., & Sons, 120 E. Lexington St.....	Baltimore
Forsythe, T. C.....	Belair
Francis, J. E.....	Punxsutawney, Pa.
Conder, B. B.....	Strasburg, Pa.
Grech, G. M.....	Somerville, N. J.
Grove, M. J.....	Lime Kiln
Havre de Grace Construction Company.....	Havre de Grace
Hoblitzell & Price.....	Meyersdale, Pa.
Highway Construction Company.....	Frederick
Holt Construction Company.....	Frederalsburg
Hunter, N. C.....	Washington, Pa.
Juniata Paving Company, Empire Building.....	Philadelphia, Pa.
Lindsey, E. P., 607 Middle Street.....	Portsmouth, Va.
Lyons Brothers, Tippetts P. O.....	Prince George's County
McClusky, M. J., R. F. D. No. 2.....	Cumberland
Messenger, R. W.....	Federalsburg
Mullan, T., Old York Road.....	Baltimore
Phillips & Andrews.....	Hurlock
Reddington, P. F., 321 St. Paul Street.....	Baltimore
Rickey-Swann Company, 23 W. State Street.....	Trenton, N. J.

⁷⁸ List supplied by State roads commission.

Robinson, I. G.	Hollidaysburg, Pa.
Silver, J. W., & Company	Belair
Spencer, J. E.	Aberdeen
Stehle & McGuckian	Annapolis
Sweeten, B. F., & Sons, 2303 Pennsylvania Avenue	Baltimore
Talnott, M. A., Company, 1110 American Building	Baltimore
Walsh, D. E.	Westminster
Webster Construction Company	East New Market

Michigan⁷⁹

Bean & Jones	Benton Harbor
Blanchard, C. H.	Roscommon
Fausey, Amos	Hastings
Geeck, Andrew, 523 Ada Street	Owosso
Good Roads Construction Company	Port Huron
Hauser, Fred	Hanover
Mitchell, Thomas	Battle Creek
Noger, R. H.	Temperance
Overman, A. T.	St. Joseph
Kneal & Ryan	Lansing

Minnesota⁸⁰

Able, Otis	Winona
Anderson, Chris	Brainerd
Biesanz, Charles	Winona
Buckley, T. B., 65 Highland Avenue	Minneapolis
Dale & Baumgartner	St. Paul
Erickson, C. S.	Mankato
Fielding & Shepley	St. Paul
Foley Brothers	St. Paul
Forrestal & Feyen	St. Paul
Frankman Brothers	St. Paul
Grant, George J. Construction Company	St. Paul
Guthrie, A., & Company	St. Paul
Johnson, Chris	St. Paul
Kennedy, T., 612 7th Street S. E.	Minneapolis
Kettle River Quarrie Company	Minneapolis
Mergens, J. J.	Excelsior
Morris & Shepard	St. Paul
Nelson Brothers Paving Company	Minneapolis
North Star Concrete Company	Mankato
Nute Naverson	Brainerd
O'Neill, J. F., Company, New York Building	Minneapolis
O'Neill & Preston	St. Paul
Plymouth Paving Company	Minneapolis
Ritarie Brothers	Brainerd
Ryan, P. J.	St. Paul
Sandeen, E. C.	St. Paul
Smith, Grant & Company	St. Paul
Turnham, George H.	Long Lake
Vaughn, J.	Brainerd

⁷⁹ List supplied by State highway department.⁸⁰ List supplied by State highway commission.

Mississippi⁸¹

Gano & Wilson.....	Mt. Vernon, Ind.
Worthington Construction Company.....	Bookhaven

Montana

Adami Brothers.....	Helena ⁸²
Johnson, Louis.....	Helena
Kirkendall, Thomas.....	Helena
Nilson-Smith Co., 1st Avenue and Great Northern Tracks...	Great Falls ⁸³

Nebraska⁸⁴

Arter, A. A., 534 Bee Building.....	Omaha
Byrne, Harry S., 512 Ware Building.....	Omaha
Canton Bridge Company.....	Omaha
Collier Construction Company.....	Fairbury
Dobson & Breck.....	Lincoln
Elkhorn Construction Company.....	Fremont
Freeman, F. L.....	Tecumseh
Hastings Foundry & Iron Works.....	Hastings
Inter Mountain Bridge & Construction Company.....	Tecumseh
McVey, Hugh.....	Grand Island
Matthews, William.....	St. Paul
Monarch Engineering Company.....	Falls City
Mool, Harry W. Company, Brandeis Building.....	Omaha
Mullen, J. L., 645 S. 18th Street.....	Lincoln
Nebraska Construction Company, Burr Block.....	Lincoln
Ward, H. T., & Company, Burr Block.....	Lincoln
Western Bridge & Construction Company, Bee Building.....	Omaha
Williams, J. F.....	Scotts Bluff

Nevada

Niedt, A. F.....	Reno ⁸⁵
Reno Construction Company.....	Reno

New Hampshire⁸⁶

Adams, Edward.....	North Andover, Mass.
Ahern Brothers.....	Norwick, Conn.
Bailey, Charles A.....	Suncook, N. H.
Caughey, George H.....	Waltham, Mass.
Cavanaugh, J. A.....	Manchester, N. H.
Coleman Brothers.....	Chelsea, Mass.
Cressy, Walter.....	Gloucester, Mass.
Darena, Marciano, 24 Battery Street.....	Boston, Mass.
Ellis, Fred E.....	Peabody, Mass.
Fannon, Jas. H., 28 Hinckley Street.....	Somerville, Mass.

⁸¹ List supplied by G. W. Sarlls, county engineer, Jackson Miss.⁸² Helena names supplied by Helena Commercial Club.⁸³ Great Falls name supplied by Great Falls Board of Commerce.⁸⁴ List supplied by State engineer.⁸⁵ Name supplied by Reno Commercial Club.⁸⁶ List supplied by State engineer.

Gaffey, John A.	Medford, Mass.
Hill, Nat. W., 220 Broadway	New York, N. Y.
Hub Contracting Company, 103 Beverly Street	Boston, Mass.
Hudson, Richmond F., 18 Baster Street	Melrose, Mass.
Jewell, W. W.	Gorham, N. H.
Killorin Construction Company	Wakefield, Mass.
Lane Construction Corporation	Meriden, Conn.
Massachusetts Broken Stone Company, 235 Franklin Street	Boston, Mass.
Martin & Condon, 84 Palfrey Street	Watertown, Mass.
Mague, Francis J.	West Newton, Mass.
O'Hara, Charles E.	Gorham, N. H.
Osgood Construction Company	Nashua, N. H.
Perry, D. T., & Sons	West Brattleboro, Vt.
Poor, Willard H.	North Andover, Mass.
Rourke, E. J.	Abington, Mass.
Stewart & Snodgrass	Merlin, N. H.
Stowers, Fred W.	Methuen, Mass.
Tilton, S. D.	Woodsville, N. H.
Tuttle, H. S., & Company	Middleboro, Mass.
Watkins, James E.	Amesbury, Mass.

New Jersey⁸⁷

Stone Road Contractors

Bamberger, Milton M.	Elizabeth
Bedel & Collins Brothers	Keyport
Brackett, George F.	Ridgewood
Brewster, George M.	Tenafly
Colfax & Steel	Pompton
Collins, James & George Gundrum	South Amoy
Cotter & Berger	Butler
Delaware River Quarry & Construction Company	Lambertsville
Demarest, M. Irving	Woodbridge
Denahan, A. C.	Trenton
Deriety, John	Newark
Dickerson & Gill	Rockaway
Dunigan, Thomas F.	Woodbridge
Eastburn, Charles T.	Yardley, Pa.
English, Edward	Ridgefield
Francisco Brothers	Little Falls
Frech, George M.	Somerville
Gibbs & Company	Clementon
Ginder, John & Son	Trenton
Graham, George	Riverside
Hardgrove, William	Somerville
Harsch, Theo.	Narberth, Pa.
Hilpet, Arthur K. & Joseph B. Cox, Jr.	West Creek
Humphrey, E. C.	Hackensack
Jannarene, Philip & Peter	Belleville
Liddle & Pieffer	Woodbridge
Lindsley, Stewart	Orange
McGarry, John J.	Edgewater
McKiernan & Bergin	Paterson
McMains, Richard C.	Irvington

⁸⁷ List supplied by State highway commissioner.

Matthews, P. A.	Caldwell
Mears, William	Sea Bright
Middlesex Supply Company	New Brunswick
Miles Tighe Contracting Company	Easton, Pa.
Mobus & Burke	Plainfield
Monmouth Contracting Company	Red Bank
New Jersey Contracting & Construction Company	Camden
O'Neill, Edward	Jersey City
Orr, Thomas G.	Freehold
Osborne & Marsellis	Montclair
Park, James C.	Cranford
Reilly, Bryant	Atlantic City
Salmon, Jeremiah B.	Hackettstown
Scott, Harry N.	Plainsboro
Sewerbutt, James S.	Paterson
Shanley's, B. M., Sons Company	Newark
Shanley, J. F., 400 Arcade Building	Philadelphia, Pa.
Shanley, J. Roosevelt	New York, N. Y.
Smalley & Kitchen	Plainfield
Snyder, George F., & Company	Philadelphia, Pa.
Spottiswood, George	Orange
Sprowl, Harvey B.	Birmingham, N. Y.
Stout, Archibald E.	Trenton
Sweeten, B. F., & Son	Camden
Tierney, John C.	Hoboken
Travell, Warren B.	Plainfield
Van Kueron & Son, Grand and Prior Streets	Jersey City
Walton, C. B., Company	Trenton
Weldon Contracting Company	Rahway
Winans, Clarence H.	Linden
Wright, Robert	East Orange

Gravel Road Contractors

Butcher, Joseph L., & J. Walter	Farmingdale
Clymer, J. L.	Philadelphia, Pa.
Fisher, Joseph S.	Clayton
Gibbs & Company	Clementon
Gleason, John	Belmar
Hafeman, Richard	Farmingdale
Hand, Robert E.	Erma
Hanselman, George & John	Cologne
Holman, L. Worrel & Frank T.	Whitesville
LeCompte, John R.	Lakewood
Lupton, A. H.	Bridgeton
Mathis, Aaron M.	New Gretna
Mathisand, C. W., Company	Tuckerton
Marcus, Andrew	Atlantic City
Miller Construction Company	Cape May City
Parker & King	Tuckerton
Potts, George	Ocean Grove
Quinlan, John & Thomas	South Amboy
Rue & Fountain	Old Bridge
Sickler, William	Sicklerville
Sutton & Corson	Ocean City
Thompson, John M.	Avon
Tuft & Lloyd	Salem
Young, John W., & Son	Anglesea

New Mexico

FEBRUARY 10, 1912.

We have no road contractors in New Mexico. At least, after considerable endeavor to secure bids on the construction of a road in Chaves County, we had to go ahead with our work on force account.

CHARLES D. MILLER,
State Engineer.

New York⁸⁸

Actna Engineering & Contracting Company.....	Herkimer
Almahar Construction Company, 100 State Street.....	Albany
Anderson, Jas.....	Brushton
Bankers Surety Company (taken over from Mohawk Engineering & Contracting Company).....	Cleveland, Ohio
Bardal, F. V. E., D S. Morgan Building.....	Buffalo
Beck, Edwd. T., & Company.....	Warren, Pa.
Begent, Fred., Company.....	Newport
Benedict, O. T.....	Pittsfield, Mass.
Benson, S. T., & Company.....	Falconer
Beskin, Samuel.....	Fishkill
Boyce, Joseph B., 9 Jackson Avenue.....	Long Island City
Boynton, Kellogg.....	Keeseville
Brayer Brothers.....	Auburn
Breese Construction Company.....	Elmira
Brewer, A. S.....	Oriskany Falls
Bridges, A. D., Sons.....	Hazardville, Conn.
Brooks & Julian, Powers Building.....	Rochester
Brotsch, Frank V., Company, Ell and Barry Building.....	Rochester
Brotsch, F. A., Triangle Building.....	Rochester
Brotsch, F. A., Jr., Triangle Building.....	Rochester
Brown & Lowe Company.....	Schenectady
Buckley Construction Company.....	Plattsburg
Bunce, H. E., & Company, 135 Fulton Street.....	Olean
Burgard, Henry P., Company, 275 Lathrop Street.....	Buffalo
Burnham, W. A., & Company.....	Glens Falls
Burns Bros. & Haley.....	Watertown
Burns, W. J., Company.....	Syracuse
Busch & Percival, 523 Brisbane Building.....	Buffalo
Baker, E. D., 27 Broome Street.....	Binghamton
Central City Paving Company, 213 Kirk Building.....	Syracuse
Chambers & Trusdale.....	Rochester
Clancy & Van Alst.....	Long Island City
Cohn, Frank L., 49 Niagara Street.....	Buffalo
Cold Spring Construction Company.....	Buffalo
Cooper, Snell Company.....	Little Falls
Conley, P. D., 338 E. State Street.....	Ithaca
Connors, Jos. H.....	Fulton
Conroy & Nixdorf, 25 William Street.....	Oneida
Consalus, John E., corner Green and State.....	Albany
Constantine Construction Company, 528 W. Avenue.....	Buffalo
Coughlin & Lawman.....	Elmira
County Construction Company, 83 3rd Street.....	Troy
Cowhig, W. J., 440 Hudson Avenue.....	Albany
Creeden & Piton, 250 W. 107th Street.....	New York City
Crowe & Walsh.....	Pittsfield, Mass.

⁸⁸ List supplied by State highway department.

Catskill Contracting Company.....	Catskill
Dale Engineering Company, 249 Genesee Street.....	Utica
DeGraff & Hogeboom, 130 Fair Street.....	Kingston
Delaware Construction Company.....	Sidney
DiMartino & Musso, 435 6th Avenue.....	Scranton, Pa.
Dollard & Heeran.....	Albany
Dollard, M. F.....	Albany
Dorpien City Construction Company, 313 Congress Street.....	Schenectady
Dower, John B.....	Ballston
Boyle & Company, E. J., 83 State Street.....	Albany
Dunbar Contracting Company, 440 E. 68th Street.....	New York City
Ellis, Fred E.....	Melrose, Mass.
Falk & Menzies, 6 S. Division Street.....	Buffalo
Flood & Van Wirt.....	Hudson Falls
Flynn, John W.....	Waterfont
Foote, Frank.....	Nunda
Fowler, F. G., Construction Company.....	Mt. Kisco
Frederick, J., & Company.....	Rochester
Gaffey, Albert, 260 Tamesville Avenue.....	Syracuse
Garafano, Jas., 45 S. 3d Avenue.....	Mt. Vernon
Geneval Construction Company, 1913 E. Main Street.....	Bridgeport, Conn.
Gill, T. H., Company, Winter Hill Station.....	Boston, Mass.
Gipp, Louis H., Company, 94 Claremont Avenue.....	Buffalo
Gordan, John H.....	Albany
Grady, Thos. & Company, Cutler Building.....	Rochester
Greese Construction Co., 718 Chamber Commerce Bldg.....	Rochester
Greenfield Construction Company, 691 West Street.....	Brooklyn
Hagaman, Miller & Hagaman, 688 Clinton Avenue.....	Rochester
Hailes, Theo. C., Jr., 86 State Street.....	Albany
Hallock & Augle.....	Newburg
Harper, Jova & Kehoe, 62 2d Street.....	Newburg
Harrigan, John, Pauli Building.....	Scranton, Pa.
Heuson, Robt. W.....	Geneva
Herlihy Contracting Company.....	Glens Falls
Herring, H. G., Jr., & Company.....	Hillsdale
Hillson Brothers.....	Albany
Holington, The, Company.....	Troy
Hopkins, Richard.....	Troy
Hucknall Construction Company.....	Albion
Hucknall, Thos.....	Albion
Hull, Seneca P.....	Cortland
Hurley & Syne.....	Fredonia
Huston, T. L., 517 Singer Building.....	New York City
Hyde, John, R. F., D. No. 1.....	Rome
Johnson, John E., & Company, 1002 Bleecker Street.....	Utica
Jordon, C. F., & Company, 40 State Street.....	Albany
Johnston, Jas. W., 5014 Bleecker Street.....	Utica
Kantrowitz, Morris.....	Albany
Karr, Thos. H.....	Troy
Kennedy Construction Company, 534 Broadway.....	Albany
Lane Construction Company.....	Meriden, Conn.
Lawlor Bros. Construction Company, 13 Park Row.....	New York City
Love, E. & M., & Son.....	Corry, Pa.
Macoffee Concrete Company.....	Athens, Pa.
Mahoney, Thos.....	Jamestown
Malloy & Davis.....	Schenectady
Meckes, F. P.....	Long Pond, Pa.

Martin, Jas. E.	Poughkeepsie
Meehan, Thos. & Sons, 7106 Germantown Avenue	Philadelphia, Pa.
Merritt Construction Company	Tuckahoe
Miller, Burr C.	Wilkes-Barre, Pa.
Miller & Knickenberg, 702 Michigan Street	Buffalo
Monroe Roads Company	Pittsford
Mosier & Summers, 1266 Seneca Street	Buffalo
Mott, Daniel L.	Utica
Moy-nohan, J. D., Company	Mohawk
Mulderry Bros.	Albany
Mullen, Henry J., 289 Fulton Street	Jamaica
Mumm, Fred J., 176 Best Street	Buffalo
Murphy, John & Thos.	Cobleskill
Murphy, J. & T.	Cobleskill
Murray, Patrick H., Cutler Building	Rochester
Murray, Thos. F.	LeRoy
McComb, Chas. O., University Building	Syracuse
McCormick, Joseph, 315 Taunton Avenue	East Providence, R. I.
McDonald, W. P., Construction Company	Mt. Vernon
McGreevy, McGuigan & Baum Company	Elmira
McIntyre, Wm., & Company	Sharon, Pa.
McNamara, James, 425 Robin Street	Dunkirk
Newport Construction Company	Newport
Niagara Construction Company	Elmira
Northwestern Construction Company	Franklin, Pa.
Orange County Road Construction Company	Central Valley
O'Hern, Thomas	Yonkers
Paddock & Williams	Oneida
Palmer, J. K., & Company	Clearfield, Pa.
Pierce, B. D., Jr., Company	Bridgeport, Conn.
Reardon C. J.	Glens Falls
Rhodey & Tyler	Albion
Rockwood, A. J., 407 Cutler Building	Rochester
Ruddy & Saunders Company, 18 State Street	Troy
Ryan & Yale	Brewsters
Santanoni Contracting Company	Newcomb
Sapienza, Jas. V., 19 Georgia Street	Buffalo
Suffolk Contracting Company	Huntington
Stewart, Kerbaugh & Shauley, 30 Church Street	New York City
Stewart, Jas., & Company, 30 Church Street	New York City
State Highway Construction Company, 50 State Street	Albany
Spuyten Duyvil Construction Company, 271 W. 125th St.	New York City
Sproul & Elsen	Peekskill
Sproul, Harvey B., Inc., 1010 Main Street	Peekskill
Snell, D. I. & Company	Canajoharie
Spellman Olives Company	Mooers
Shutt, Albert M.	Sidney
Sherrill Hardware Company	Hudson Falls
Shaughnessey, T. F., & Company, 372 Broadway	Albany
Semper Bros.	Watertown
Schunnemunk Construction Company	Highland Mills
Schroeder Hicks Construction Company	Rochester
Schroeder, Henry C., 419 German Insurance Building	Rochester
Schaupp, Alonzo	Albany
St. Regis Construction Company	Albany
Sbarra-Reynell Construction Co., 442 Hancock Street	Long Island City
Taylor & Onsterhondt	Olean

Troy & Mack.....	Olean
Van Wagonen, S. B.....	Rondout
Walker, Joseph.....	New Paltz
Walworth, Town of, W. E. Gould.....	Lincoln
Warren Bros. Company, 59 Temple Place.....	Boston, Mass.
Weidman, John H., 304 Kirk Building.....	Syracuse
Wells, Boughton & Company.....	Troy
White & Colligan.....	Purchase
Wiltzie & Rigney.....	Rensselaer
Wood & Tompkins.....	Hilton
Wood, Tompkins & Truesdale.....	Hilton
Young, Andrus D., 121 Putnam Avenue.....	Brooklyn

North Carolina⁸⁹

Brett Engineering & Contracting Company.....	Wilson
Lassiter, R. G.....	Oxford
Tompkins, D. A. Company.....	Charlotte
White, G. C.....	Durham

North Dakota

FEBRUARY 12, 1912.

We have no contractors in the State who make a specialty of road work other than a few of minor importance, for the reason that no State aid is granted in highway construction.

T. R. ATKINSON,
State Engineer.

Ohio⁹⁰

Adams Brothers.....	Zanesville
Alliance Clay Product Company.....	Alliance
American Contractor, 40 Dearborn Street.....	Chicago, Ill.
American, The, Rolling Mill Company.....	Middletown
Archer & Day.....	Bellaire
Associated, The Contractor, New First National Bank Bldg.....	Columbus
Bates, Harry.....	Steubenville
Bauer, George, Jr.....	Pomeroy
Barr, J. S., 8208 Clar Avenue.....	Cleveland
Baker, Ezra.....	Arcanum
Bellevue Stone Company.....	Bellevue
Bessemer, The, Limestone Company.....	Youngstown
Bibler, William A., & Sons Company.....	Arlington
Big, Four Clay, Company.....	Canton
Bluffton Stone Company, The.....	Lima
Bock, George J.....	Coshocton
Boots, Baile & Conklin.....	New Jasper
Broken Sword Stone Company, The.....	Bucyrus
Brode, W. M. & Company.....	Newcomerstown
Buel & Baker.....	Salem
Buckeye Stone Company, The.....	Bluffton
Buckeye Brick & Block Company, The.....	Zanesville
Burt, D. S.....	Byesville
Butler Stone Company, The, Box 201.....	Sandusky
Capitol Limestone Company, New First National Bank Bldg.....	Columbus

⁸⁹ List supplied by State geologist.

⁹⁰ List supplied by State highway department.

Callaghan, C. R.	Bellevue
Castalia Stone Company	Castalia
Carroll & Gruber	Caledonia
Chinnock, C. J.	Warren
Christian, George B.	Marion
Chinnock, A. E.	Champion
Cisler, L. T.	Mariette
Cleveland Macadam Co., The, 901 American Trust Bldg.	Columbus
Colgan Machinery & Supply Company, New Haven Bldg.	Columbus
Columbus Macadam Company	Columbus
Cochran, F. C.	Moundsville, W. Va.
Conley, J. E. & Company	Dayton
Contractors Daily News, 510 Caxton Building	Columbus
Danforth & Munn	Chagrin Falls
Deckman-Duty Brick Company	Cleveland
DeGroodt, S. H., 127 E. Woodland Avenue	Youngstown
Dellinger, Howard	Chicago
Devine, J. C.	Alliance
Dickson, J. G.	Bellevue
Dickson & Pickett	Martins Ferry
Doan, C. H., Ruggery Building	Columbus
Dodge, The F. W., Company	Columbus
Doll & Linn, 801 Bowers Street	Akron
Downs, F. A.	Canton
East Libery Stone Company	Bellefontaine
Eaton, James, 83 W. Duncan Street	Columbus
Enterprise Paving & Construction Company, The	Cleveland
Elyria Stone Company	Grafton
Evans, J. Lime & Stone Company	Marion
Farison, G. W.	Malinta
Faragher, B. P., 627 Rose Building	Cleveland
Farr, Chester M., 1679 Crawford Road	Cleveland
Fowler, Samuel	Barnesville
Frowine, Albert	Smithfield
France Company, The, Ohio Building	Toledo
Fultonham Brick Company, The	Axline
Garver Contracting & Transfer Company, The	Hamilton
Geiger, Fred L.	Warren
Gialdini, G. A., & Company	Girard
Gould & Maybach	Cleveland
Goetschius Stone Company, The	Ottawa
Grimes, J. A.	Portsmouth
Grafton Stone Company	Grafton
Greenville Gravel Company	Greenville
Gregg, W. S.	Zanesville
Hancock Stone Company, The	Findlay
Harris Brick Company	Zanesville
Hatcher, E. N.	Zanesville
Heburn, W. R. & Company	Mt. Pleasant
Herzog, John & Son	Patterson
Hicks, J. H.	Dennison
Hill, T. W.	Bellefontaine
Huber Manufacturing Company, The	Marion
Huonker & Williams	Springfield
Independence Stone Company	South Park
Indian Refining Company, First National Bank Building	Cincinnati
Jackson Stone Company	Covington

Jenkins & Hines	Frankfort, Ind.
Jewett, W. R.	Worthington
Jones, C. J., 177 W. Park Avenue	Columbus
Juniper & Nixon	Nelsonville
Kaps Brothers	Portsmouth
Karch, Joseph & Son	Celina
Kelly Brothers	Portsmouth
Kelly-Springfield Roller Company	Springfield
Kelly Island Stone Supply	Cleveland
Kellogg, T. P.	Norwalk
Kennedy, F. M.	Marysville
Kennedy & Warner	Medina
Keystone Refining Company	Columbus
Killen, Charles	Columbus Grove
Kunkle, K. E.	Dayton
Lee & Grigs	Millersburg
Lehman, J. W., 58 S. 5th Street	Columbus
Lewisburg Stone Company	Lewisburg
Lindsey, J. B.	Middleport
Lime Stone Company, The	Lima
Ladd & Able	Bowling Green
Lehigh Portland Cement Company	Cleveland
Logan Brick Mfg. Company, The	Toledo
Lunsford, Basil	Arabia
McAlonan Brothers	Akron
McDowell, W. A., 321 Miles Avenue	Cleveland
McGinty Contracting Company, The	Minerva
McHugh, William	Springfield
McLane & Armstrong	Libson
McMath & Kelly	Freeport
Mango, V.	Niles
Marson, W. J., 413 Everett Building	Akron
Masters, E. W., 323 Todd Avenue	Warren
Mercer, George E. Stone Company	Bowling Green
Miller, C. J.	Toledo
Mitchell, Frank S.	Bellefontaine
Monroe, S. & Sons	Portsmouth
Moore, William	St. Clairsville
Morehead Construction Company	Caldwell
Morgan, E. E.	Ravenna
Municipal Engineering & Construction Company	Indianapolis, Ind.
Myers, W. E., 438 Market Street	Kenton
Neville, Jarry	Mingo Junction
Nicholson, Thos. W., 2123 E. 107th Street	Cleveland
Noble Brick Company	Glenwood
Norman, T. J. & Son	Coshocton
Novelty Brick & Coal Company, The	Newcomertown
Oatley & Griffing	Cortland
Ohio Paving Company, The	Toledo
Ohio & Western Lime Company	Marion
Ohio Crushed Stone Company, The, Conover Building	Dayton
Ohio Engineering Company	Elyria
Owens, John D. Company, The	Owens
Parker, R. H., care of Harris Brick Co., Union Trust Building	Cincinnati
Patterson, E. A.	Malta
Patterson, Allen	Lima
Petrie, Arthur & Turner	Flushing
Perkins, C. E.	Akron

Peters & Palmer	Marietta
Petit & Able	Zanesville
Philips, D. A.	Ashland
Platten, M. P., 3100 Lorain Avenue	Cleveland
Portage Silica Sand & Gravel Company	Youngstown
Portsmouth Paving Block Company, The	Portsmouth
Prosser, T. D. Company	Wheeling, W. Va.
Putman & Price	Marietta
Radebaugh, E. C.	Logan
Ready, A. H.	Warren
Reinheimer Stone Company, The	New Paris
Rinehart Brothers	East Liverpool
Rimer Stone Company	Rimer
Rodgers, E. J., & Company, Colonists Savings & Trust Bldg	Columbus
Roche, Thos. M., 234 Michigan Avenue	Chicago, Ill.
Rosser & Maloney	Bellaire
Ryan Stone Company	North Baltimore
Ryan, C. W.	Maumee
Sand & Gravel Company, The	East Liverpool
Shaw, H. J., Colonists Savings & Trust Company	Columbus
Shaw, H. L.	Lorain
Snouffer, J. M., 46 W. Oakland Avenue	Columbus
South Zanesville Sewer Pipe & Brick Company, The	Zanesville
South Shore Construction Company	Erie, Pa.
Scioto Stone Company, The, Chamber of Commerce Bldg	Columbus
Shields, Horace	Hamilton
Spence Brothers, 12409 Euclid Avenue	Cleveland
Springer & Reufnacht	New Philadelphia
Statler Stone Company, The	Piqua
Stony Ridge Stone Company, The, Chamber of Commerce Bldg	Toledo
Strunk-Meyer Lime Company	Cold Springs
Taylor, A. R.	Findlay
Timmons, R. L.	Cadiz
Toledo Stone & Glass Sand Company	Toledo
Townsend, E. H.	New Richmond
Townsend, Orville N.	Zanesville
Tubman, A., 872 Fairmont Stret	Cleveland
Turner & Loos	Newcomertown
Uncapher & Scott	Marion
United Paving Company	Atlantic City, N. J.
The Automatic Shovel Company, The, care of A. C. Vicary	Lorain
Vogt, William H. & Sons	Massillon
Warnick, J. P.	Cadiz
Wagner Stone Company, The	Sandusky
Welch & Jones	Marysville
Weckerly, John	Whitehouse
White Sulphur Stone Company	White Sulphur
Whitehouse Stone Company, The	Toledo
Wildes, James	Akron
Wilson & Yardley	Newark
Wilson & Dean	Xenia
Wills, Frank M.	New Philadelphia
Wirtz, A. Transfer Company & J. H. Trunk, The	Hamilton
Wise, F. M.	Macedonia
Winchell & McDaniel, 101 Clinton Building	Columbus
Woodruff & Pausch	Columbus
Woodrow, J. S.	Warren
Young, L. H.	Mineral Ridge

Pennsylvania⁹¹

Ambler-Davis Company, 14 S. Broad Street.....	Philadelphia
Anderson, Joseph.....	Delaware City, Del.
Atlantic Refining Company, Bourse Building.....	Philadelphia
Barber & Perring, Land Title Building.....	Philadelphia
Bilmater, C. H., 1335 West Lehigh Avenue.....	Philadelphia
Bolger & Cummings, Germantown and Cheltenham Avenue.....	Philadelphia
Borneman, F. W.....	Lansdowne
Caven, Frank H., 615 Fidelity Building.....	Philadelphia
Clark, John A., 603 W. 5th Street.....	Wilmington, Del.
Clarke, John T., 1204 North 37 Wall Street.....	New York, N. Y.
Cocoo, Antonio, 601-2 Fidelity Building.....	Philadelphia
Commonwealth Construction Company, Times Building.....	New York, N. Y.
Corcoran Construction Company.....	West Chester
Cunningham Paving & Construction Company, German American Building.....	Philadelphia
Davis, William P.....	West Chester
Delaware Granite & Mining Company.....	Wilmington, Del.
Difenderfer, R. E. & Company, 419 Bourse Building.....	Philadelphia
Dodge, F. W. Company, The, 603 Chestnut Street.....	Philadelphia
Doran, John J., 428 E. Marshall Street.....	Norristown
Eastern Petrolithic Company, 37 Railroad Avenue.....	Freeport, N. Y.
Evans, W. C.....	Ambler
Filbert Paving & Construction Company, Pennsylvania Bldg.....	Philadelphia
Francis, J. E.....	Punxsutawney
Frech, George M.....	Somerville, N. J.
Good Roads Improvement Co., First National Bank Bldg.....	Cincinnati, O.
Haigh, Arthur H., Post Office Building.....	Germantown
Hanlon, John F. Company, Inc., 1335 Real Estate Bldg.....	Philadelphia
Heddon, E. J., 14 S. Broad Street.....	Philadelphia
Horrigan Construction Company, Ford Building.....	Wilmington, Del.
Juniata Paving Company, Empire Building.....	Philadelphia
Kelly, John A., Company, 512 Pennsylvania Building.....	Philadelphia
Latham, Fayette, M.....	Chestertown, Md.
McClellan, William.....	Stratford
Manufacturers Contracting Company.....	Wilmington, Del.
Moore, H. O. & Company, 407 Sansom Street.....	Philadelphia
Nelson-Merydith Company.....	Chambersburg
Nolan Brothers.....	Reading
O'Connell, D. E.....	Kennett Square
O'Neal, John F.....	Mt. Cuba, Del.
Riley, Fisher & Carozza, 211 E. Fayette Street.....	Baltimore, Md.
Snyder, Geo. F., Company, 129 S. 5th Street.....	Philadelphia
Stewart & Donohue.....	Wilmington, Del.
Stewart, J., 55th and Walnut Streets.....	Philadelphia
Tilton, James, 7 N. Georgia Avenue.....	Atlantic City, N. J.
United Paving Company, 537 Bartlett Building.....	Atlantic City, N. J.
Vogt & Golden, 22d and Cambria Streets.....	Philadelphia
Wickersham, B. F.....	Kennett Square
Williams, John J., & Company.....	Chester

⁹¹ List supplied by State highway department.

Rhode Island⁹²

Bristow Brothers, Knowles Corporation.....	Narragansett Pier
Callan, Luke H.....	Bristol
Couture, Adelard.....	Arctic
Hathaway & Cotton.....	Tiverton
McCormick, Joseph.....	East Providence
Peckman Brothers.....	Newport
Quinn, Thomas J.....	Ashton
Westerly Concrete Company.....	Waverly

South Carolina

Blassingame, J. T.....	Greenville ⁹³
Cain, John J.....	Columbia ⁹⁴
Cauble, J. O.....	Greenville
Columbia Concrete Company.....	Columbia
King, J. N.....	Greenville
Lawrence, J. R.....	Greenville
Lide, C. M.....	Columbia
Simons-Mayrant Company.....	Charleston ⁹⁵
Summersett, J. A.....	Columbia
Taylor, Mark.....	Columbia
Wise Granite Company.....	Columbia
Weston & Brooker.....	Columbia

South Dakota⁹⁶

Atkinson, C. H.....	Watertown
Airey, R. B.....	Pierre
Anderson, Albert.....	Pierre
Fanehust Construction Company.....	Sioux Falls ⁹⁷
Huston, R. J.....	Sioux Falls
Ledyard, L.....	Sioux Falls
Sampson, Joe.....	Sioux Falls
Stolte & Miencier.....	Redfield
Taylor Construction Company.....	Volga

Tennessee

Garvey, G. M.....	Memphis ⁹⁸
Hollis, C. J.....	Memphis
McCadden, P.....	Memphis
McTighe, C. M.....	Memphis
Pentecost & Bryan.....	Memphis
Roach & Manigan.....	Memphis
Smith, C. D. & Company.....	Memphis
Troy, W. B.....	Memphis

⁹² List supplied by State board of public roads.⁹³ Greenville names supplied by city engineer.⁹⁴ Columbia names supplied by chamber of commerce.⁹⁵ Charleston name supplied by chamber of commerce.⁹⁶ Names supplied by State engineer.⁹⁷ Sioux Falls names supplied by Commercial Club.⁹⁸ Memphis names supplied by Business Men's Club.

Texas

Davis, B. F. & C. M., Construction Company.....	Fort Worth ⁹⁹
Freund, Frank.....	Galveston ¹⁰⁰
Hadden, William, D.....	Galveston
Kelly, W. A., Gunther Building.....	San Antonio ¹⁰¹
Larkin, Thomas.....	Dallas ¹⁰²
Ling & Hughes, Almo Heights.....	San Antonio
Lelso & Vautria.....	Galveston
McGregor, M., Almo Bank Building.....	San Antonio
Nelson, J. P., Sr.....	San Antonio
Roach & Manigan.....	Fort Worth
Russell, J. D., 515 Mason Street.....	San Antonio
Oekander Brothers.....	Waco ¹⁰³
Petrolithic & Construction Company.....	El Paso
Purvis & Company.....	Fort Worth
Scott, William, 302 San Pedro Avenue.....	San Antonio
Standard Engineering & Construction Company.....	Dallas
Texas Building Company.....	Fort Worth
Trinity Engineering & Construction Company.....	Dallas
Texas Bitulithic Company.....	El Paso ¹⁰⁴

Vermont

McCale, Francis H., Oak Ledge.....	Burlington ¹⁰⁵
Sheeran, Perter, 422 North Street.....	Burlington

Virginia¹⁰⁶

Adams, W. D. Jr.....	Lynchburg
Bennett, J. T.....	Danville
Bennington, S. B., 912 Cabell Street.....	Lynchburg
Birch, J. E., R. F. D. No. 1.....	Balston
Boxley Brothers.....	Roanoke
Bruce, R. S.....	Lexington
Bradley, Jas. F. & Company.....	Richmond
Buck Construction Company.....	Norton
Bunn & Company.....	Big Stone Gap
Clark, Porter A.....	New Castle
Colbert, L. R.....	Massaponax
Dalby, Nottingham & Company, Box 180.....	Portsmouth
Denby, R. P.....	Norfolk
Duncan, James.....	Alexandria
Ford, J. R., 1609 Fillmore Street.....	Lynchburg
Gills, John W.....	Lynchburg
Guild & Company, Box 193.....	Norfolk
Hankins, L.....	Richmond
Harman, L.....	Christianburg

⁹⁹ Fort Worth names supplied by chamber of commerce.

¹⁰⁰ Galveston names supplied by secretary, Gulf Coast Good Roads Association.

¹⁰¹ San Antonio names supplied by chamber of commerce.

¹⁰² Dallas names supplied by chamber of commerce.

¹⁰³ Waco name supplied by board of trade.

¹⁰⁴ El Paso name supplied by chamber of commerce

¹⁰⁵ Burlington names supplied by Commercial Club.

¹⁰⁶ List supplied by State highway commissioner.

Henkle, J. M.	Buena Vista
Hurt, J. H. & W. W.	Wytheville
Johnson, L. M.	Arlington
Lane Brothers Company	Altavista
Lawson, J. S.	Wytheville
Layman Brothers & Company	New Castle
Lindsay, E. P.	Portsmouth
Long, John C.	James River
Luck Construction Company	Roanoke
McKinney & Slocombe	Lynchburg
McMahon, J. T., 302 Board of Trade Building	Norfolk
Matthews-Curtis Company	Clifton Forge
Meem, J. L., Engineering Company	Lynchburg
Mundy Brothers	Amherst
Nance, W. A.	Bedford
Pendleton & Rule Construction Company	Wytheville
Pettitt, James	Arlington
Pierce, R. M., Lynch Building	Lynchburg
Rogers, Dr. C. E.	Covington
Rust, Robert N., R. F. D. No. 2	Alexandria
Sanders & Fry	Seven Mile Ford
Smith & Lowe	Pulaski
Smith, I. J., & Company	Richmond
Specialty Construction Company, Box 728	Norfolk
Taylor, Guy	Clintwood
Tidewater Construction Company, 2124 Chaffin Street	Richmond
Trice, G. E., & Company	Hampton
Valz, A. M.	Staunton
Vaughan Construction Company	Roanoke
Veitch, W. P., 214 S. 6th Street	Richmond
Walton & Company	Falls Mills
Warden, Hottel & Company	Pulaski
Weaver, W. D., R. F. D. No 1	Harrisonburg
Wingate & McGhee	Roanoke
Wise, W. H.	Arlington
Wrenn, James F., 436 Hamilton Avenue	Norfolk
Wood, J. R.	Lynchburg
Yoder, H. W.	New Castle

Washington¹⁰⁷

Anderson, J. S.	Chehalis
Allred & Hames	Rochester
Banderet, George A.	Renton
Barnett Construction Company	Tacoma
Barton-Codwell	Tacoma
Bell-Scott Company	Seattle
Bertleson & Sons	Tacoma
Braly & Whitlock	Seattle
Buck, Rufus	Seattle
Butler Construction Company	Seattle
Caldwell, M. M.	Tacoma
Coventon, Harry	Elwha
Crawford & Togue	Spokane
Frazier, F. W.	Seattle
Folliett, Kerr F.	Everett

¹⁰⁷ List supplied by State highway commissioner.

Gerrick & Gerrick	Seattle
Guernsey & Kincaid	Tacoma
Hall & Hunley	Newton
Haitt, W. G.	Moclips
Howes, R. A.	Spokane
International Construction Company	Seattle
Johnson, Edward	Bridgeport
Kendall & Moulton	Elbe
Leonard Construction Company	Seattle
McDermott & Driscoll	Seattle
Macquaid & Moore	Seattle
Mitchell & Moore	Olympia
Nick, Mandie	Spokane
Northwest Bridge Company	Tacoma
Ollar-Robinson Construction Company	Tacoma
Pacific Structural Steel Company	Seattle
Pearson Construction Company	Seattle
Powers Construction Company	Seattle
Puget Sound Bridge & Dredging Company	Seattle
Quigg & Company	Wenatchee
Rector & Daly Teaming Company	Vancouver
Sibley Construction Company	Spokane
Sloane Brothers	Seattle
Traphangen, D. H.	Seattle
Tweeden & Caldwell	Tacoma
Washington Macadam Company	Seattle
Wells Construction Company	Tacoma
Wilson, D. H.	Mahton
Zindorf & Elliott	Seattle
Young & Landes	Mossyrock

West Virginia

Cramer, J. L.	Parkersburg ¹⁰⁸
Dixon & Pickett Company	Wheeling ¹⁰⁹
Freshwater Brothers	Huntington ¹¹⁰
Hallock, L. G. & Company	Wheeling
Garrison & Dean	Huntington
Kennedy, Con.	Parkersburg
Lemen, George W. & Company	Wheeling
Nelson Merydith Company, 312½ Market Street	Parkersburg
Scanlon, T. S. & Company	Huntington
Skidmore, C., Market Street	Parkersburg

Wisconsin

Johnson, Chris	Oshkosh ¹¹¹
Larsen, L. A.	Oshkosh
Rasmussen, J. R. & Sons	Oshkosh

Wyoming

Petry, Nicholas G., 414 West 18th Street	Cheyenne ¹¹²
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¹⁰⁸ Parkersburg names supplied by chamber of commerce.

¹⁰⁹ Wheeling names supplied by board of trade.

¹¹⁰ Huntington names supplied by chamber of commerce.

¹¹¹ Oshkosh names supplied by chamber of commerce.

¹¹² Cheyenne name supplied by E. L. Emery, president Laramie County Good Roads Association.

APPENDIX

SUPPLEMENTARY LIST

Sustaining Members

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Mr. R. A. Long	Mr. George C. Wilson

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Mr. John A. Bloyd	Mr. Graham H. Harris
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Mr. R. M. Calkins	sas City Branch
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Mr. George Boone Carpenter	Mr. Victor F. Lawson
Chamber of Commerce, San Diego	Mrs. Clinton Locke
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Mr. E. S. Clark	Miss Alice M. Longfellow
Concrete Publishing Company	Mr. Charles L. Lyon
Mr. Charles H. Conover	Mr. H. K. McCay
Mr. Fred'k S. Converse	Mr. Alvin C. McCord
Mr. John E. Cornell	Mr. W. S. McCrear
Mrs S. Ella Wood Dean	Mr. J. U. C. McDaniel
Mr. Albert B. Dewey	Mr. William D. McIlvaine
Dewey Portland Cement Co.	Dr. S. J. McPherson
Mr. William H. Dixon	Mr. John de Navarre Macomb, Jr.
Mr. Richard S. Dow	Mrs. Frank Marble
Edison Portland Cement Company	Mr. E. P. Mathewson

- Mr. Wm. B. Mathews
Mr. S. W. Meals
Mr. W. R. Meservie
Mr. B. Michaud
Mr. G. D. Miller
Mr. A. Ford Miller
Mr. R. T. Miller
Col. S. A. Moore
Mr. F. S. Mosely
Mr. Guy Norman
Oklahoma Portland Cement Co.
Mr. Edward B. Passano
Mr. W. G. Pearce
Mr. Hamilton Perkins
Mr. Stuyvesant Pierrepont
Piedmont Hotel, Atlanta, Georgia
Mr. William M. Pindell
Dr. W. M. Polk
Mr. Francis A. Price
Mr. William H. Ramsey
Isham Randolph & Co.
Mr. C. Gordon Reel
Mr. M. T. Roach
Rock Products
Mr. L. M. Rowland
Mrs. Dexter P. Rumsey
Mr. J. S. Runnells
Mr. J. W. Ruth
Mr. Paul D. Sargent
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Mr. Charles P. Salen
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Mr. Chas. A. Stone
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Mrs. Theodore Thomas
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Mr. Wm. R. Thompson
Mrs. Wm. Reed Thompson
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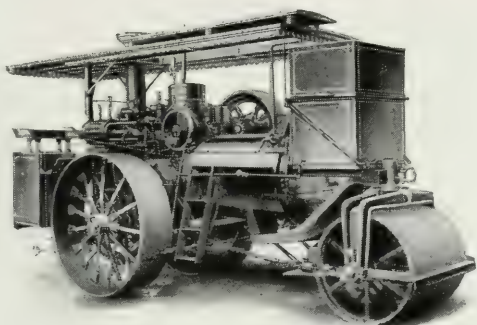
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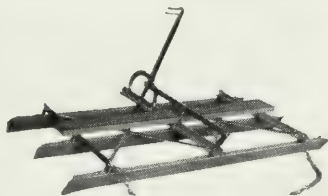
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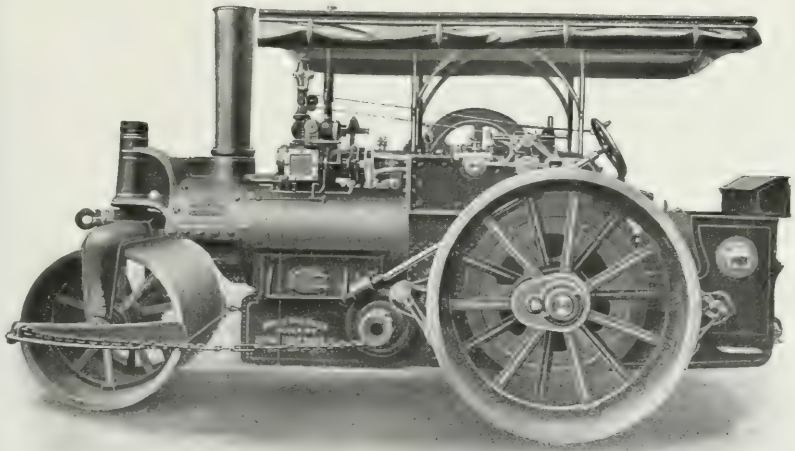
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For permanent macadam road construction. Bermudez Road Asphalt is the only **Lake** asphalt macadam binder; that is why it does not "bleed," volatilize or coke, and allow the macadam to ravel. "It stays put," because nature has exhausted her destructive influences upon it **before** it goes into roads. Perfectly adapted to city boulevards, park drives and town streets, as well as to country roads. Send for the Bermudez Road Book.

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Latest Developments in Tarvia

TARVIA was the first bituminous preparation which appeared on the American market for preserving macadam roads and eliminating the dust nuisance.

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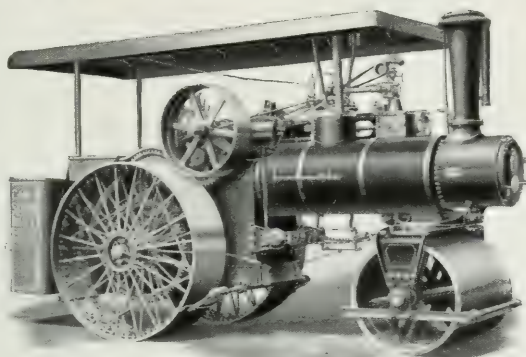
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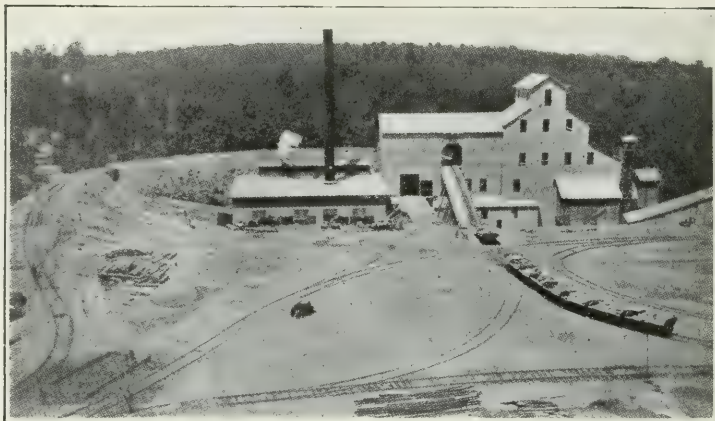
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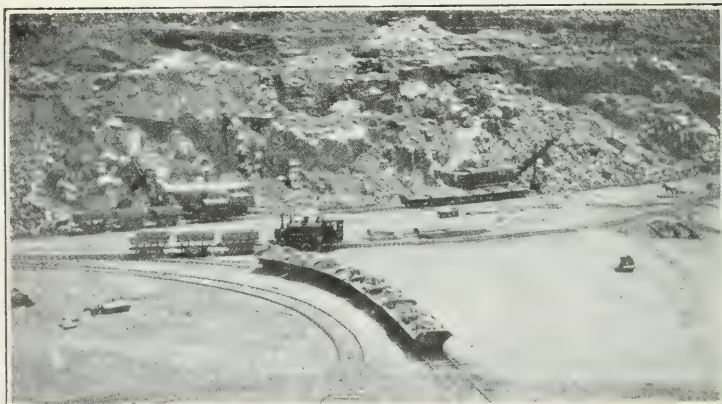
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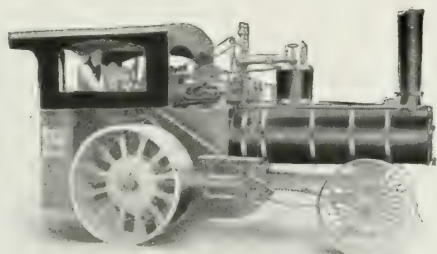
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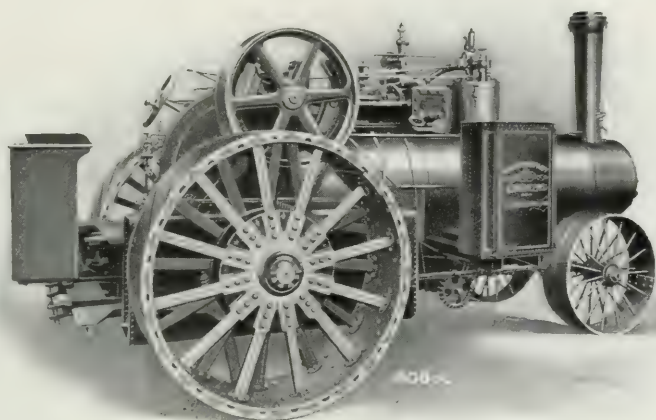
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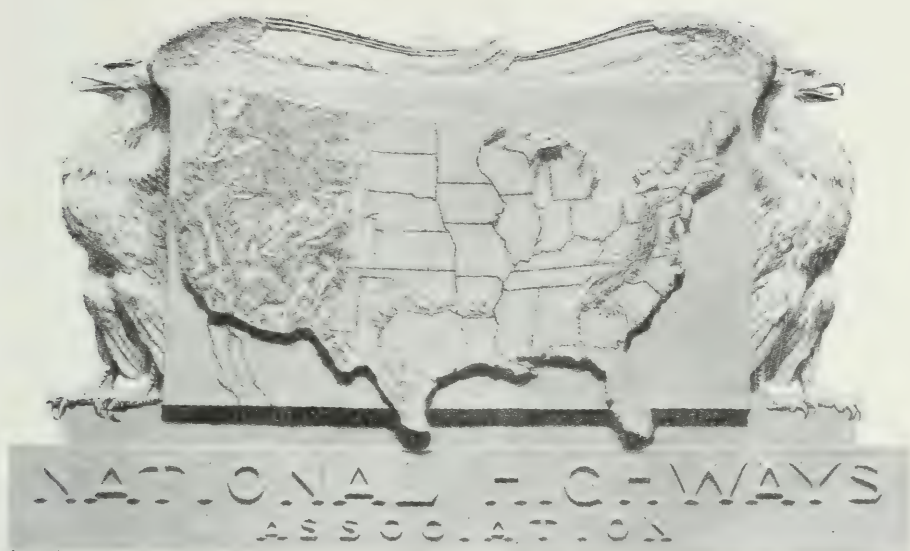
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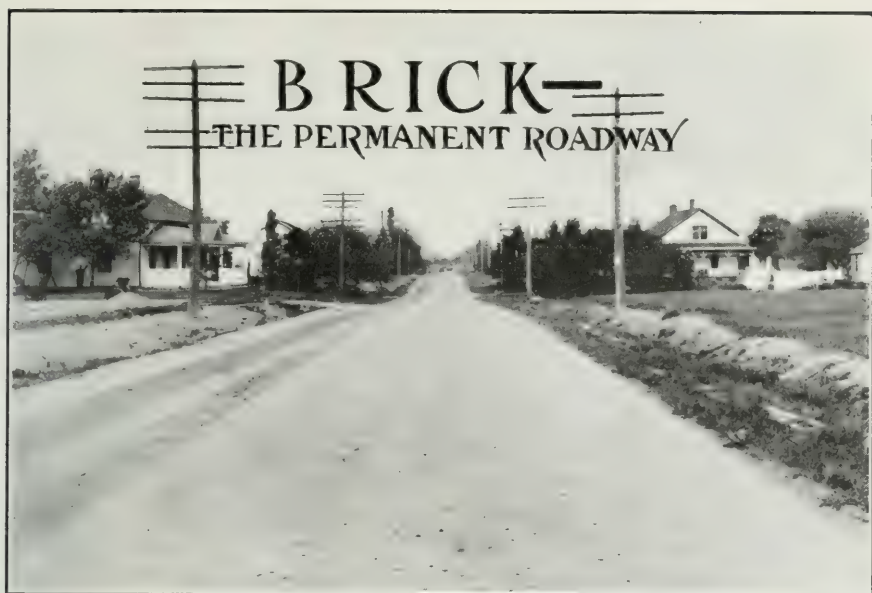
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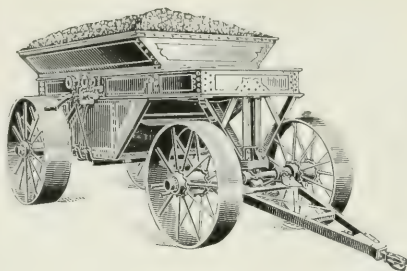
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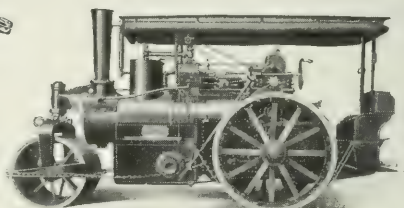
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This action is continuous and the result cumulative, so that glutrin bound roads grow harder as they grow older.

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It is absolutely different from, and better than, any other binder on the market.

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that is the demonstrated result from the use of Solvay Granulated Calcium Chloride as a road binder—after two years of most rigid tests on many kinds of roads. The surface is not discolored nor sticky and wonderfully resists the wear of traffic.

SOLVAY

Granulated Calcium Chloride

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Two applications a season will keep a road surface in excellent condition the year 'round. Roads treated with Calcium Chloride do not sweat, rot or ravel and need no top dressing.

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Between a heavy road oil and a solid binder. Specially suitable for roads that have been stripped of the original surface, and have the top course of stone exposed.

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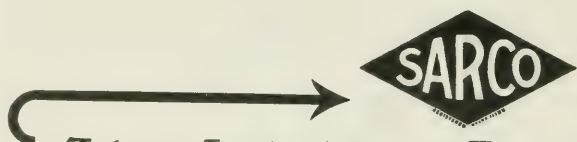
Emulsifying Road Oil A lighter asphaltic oil, prepared to mix readily with water. Particularly serviceable as a dust preventative for parks, private estates, boulevards, etc. Requires frequent application where traffic is heavy.

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ON

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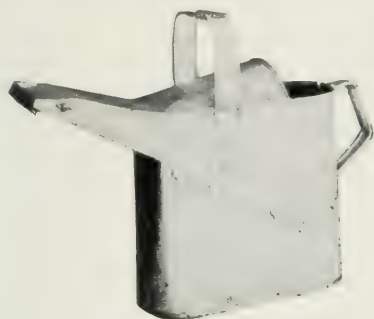
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